

Memorandum



Date: September 14, 2004

GOE
Agenda Item No. 2 (A)

To: Honorable Chairperson Barbara Carey-Shuler, Ed.D.
and Members, Board of County Commissioners

From: George M. Burgess
County Manager

Subject: Resolution Adopting the Miami Dade County Street Tree Master Plan

RECOMMENDATION

It is recommended that the Board of County Commissioners approve the attached resolution adopting the Miami-Dade County Street Tree Master Plan (Plan). This Plan (Attachment A) establishes policies and guidelines for County agencies in managing urban tree resources.

BACKGROUND

Adequate tree canopy is vital to the environmental and economic well being of our community. Trees provide oxygen; improve air quality by absorbing pollutants and particulate matter from the air; save energy by shading homes, offices, and streets, resulting in lower summer temperatures; reduce storm water runoff by intercepting rainfall through their leaves and branches and releasing it slowly and also actively removing water from the soil; and increase property values and make communities more appealing. Recent studies have also shown a positive correlation between trees and social benefits and quality of life indicators.

Miami-Dade County has experienced dramatic growth throughout this century, as well as explosive invasive plant growth and natural disasters including hurricanes, floods, and pathological/entomological outbreaks that have decimated the County's Tree Canopy. American Forests and the Department of Environmental Resources Management (DERM) conducted a canopy analysis in 1996 that indicated the average tree canopy in Miami-Dade County was 10 percent while the average metropolitan area in the United States has tree cover of approximately 33 percent. Since 1996, approximately 600,000 citrus trees were removed for the citrus canker eradication program, drastically worsening the situation. Proactive measures are needed to reverse this trend. One such measure has been the Adopt-a-Tree Program that deals with canopy replacement on private property.

Additionally, on June 5, 2001, the Board adopted Resolution No. R-650-01 directing the formulation of a plan to guide future street tree plantings (public trees) and the development of a maintenance program for the existing inventory of street trees, and the new plantings. An interim report was provided to the Board on September 24, 2001.

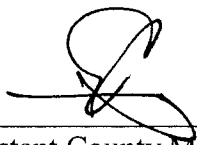
A working group comprised of representatives from DERM, Public Works, Park and Recreation, Planning and Zoning, the County Manager's Office, and the Cooperative Extension Service was created. After reviewing current practices, the group developed the attached Street Tree Master Plan for the Board's consideration. One of the key recommendations of the plan is the development of the list of recommended street trees. Some species poorly adapt to the harsh conditions encountered in urban environments by street trees or may present hazardous conditions from aggressive root growth or brittle limb structure. This Plan will complement the efforts of the County's Community Image Advisory Board and coordinate the activities of the above-referenced agencies with regard to the management of public tree resources. Workshops were held during the development of the Street Tree Master Plan to garner municipal and community input.

The Street Tree Master Plan establishes policy direction to begin management of Miami-Dade County's urban tree resources as a necessary priority. Its mission is to provide the framework to design and implement street tree plantings that complement and enhance the purpose and intent of the Landscape Ordinance and as a means of tree canopy enhancement. The Plan was developed to address concerns regarding trees along our streets and highways and describes the procedures for planting and maintenance of street trees throughout Miami-Dade County. Some of the following initiatives will be undertaken to meet the goals of the Plan:

- Appointment of a County Arborist
- Expanded role of the County Landscape Committee
- Expanded inventory coordination of street tree plantings
- Research of historical habitat and ecology conditions
- Development of guidelines for rare, threatened, or endangered tree species
- Expanded education and outreach
- Annual update to the BCC on the status of the street tree canopy

The financial impact of implementation of the Street Tree Master Plan initially requires the hiring of the County Arborist. It is anticipated that further impact will occur with implementation of key recommendations, however, it will be the responsibility of the County Arborist to pursue funding alternatives.

In addition to the Street Tree Master Plan, attached (Attachment B) is the draft *Guide to Tree Planting and Maintenance in the Public Right-of-Way* that will be utilized to educate the public on the types of trees and their care in public rights-of-way that will be updated regularly as needed.



Assistant County Manager




MEMORANDUM

(Revised)

TO: Hon. Chairperson Barbara Carey-Shuler, Ed.D.
and Members, Board of County Commissioners

DATE: October 5, 2004

FROM: 
Robert A. Ginsburg
County Attorney

SUBJECT: Agenda Item No.

Please note any items checked.

- ☐ "4-Day Rule" ("3-Day Rule" for committees) applicable if raised
- ☐ 6 weeks required between first reading and public hearing
- ☐ 4 weeks notification to municipal officials required prior to public hearing
- ☐ Decreases revenues or increases expenditures without balancing budget
- ☐ Budget required
- ☐ Statement of fiscal impact required
- ☐ Bid waiver requiring County Manager's written recommendation
- ☐ Ordinance creating a new board requires detailed County Manager's report for public hearing
- ☐ Housekeeping item (no policy decision required)
- ☐ No committee review

Approved _____ Mayor

Agenda Item No.

Veto _____

Override _____

RESOLUTION NO. _____

RESOLUTION ADOPTING THE MIAMI-DADE
COUNTY STREET TREE MASTER PLAN

WHEREAS, this Board desires to accomplish the purposes outlined in the accompanying memorandum, a copy of which is incorporated herein by reference,

NOW, THEREFORE, BE IT RESOLVED BY THE BOARD OF COUNTY COMMISSIONERS OF MIAMI-DADE COUNTY, FLORIDA, that this Board hereby approves the Miami-Dade County Street Tree Master Plan in substantially the form attached hereto and made a part hereof.

The foregoing resolution was offered by Commissioner _____, who moved its adoption. The motion was seconded by Commissioner _____ and upon being put to a vote, the vote was as follows:

Dr. Barbara Carey-Shuler, Chairperson

Katy Sorenson, Vice-Chairperson

Bruno A. Barreiro

Betty T. Ferguson

Joe A. Martinez

Dennis C. Moss

Natacha Seijas

Sen. Javier D. Souto

Jose "Pepe" Diaz

Sally A. Heyman

Jimmy L. Morales

Dorrian D. Rolle

Rebeca Sosa

The Chairperson thereupon declared the resolution duly passed and adopted this 5th day of October, 2004. This resolution shall become effective ten (10) days after the date of its adoption unless vetoed by the Mayor, and if vetoed, shall become effective only upon an override by this Board.

MIAMI-DADE COUNTY, FLORIDA
BY ITS BOARD OF COUNTY
COMMISSIONERS

HARVEY RUVIN, CLERK

Approved by County Attorney as
to form and legal sufficiency. ST

By: _____
Deputy Clerk

ATTACHMENT A
GREENPRINT FOR OUR FUTURE
MIAMI-DADE COUNTY STREET TREE MASTER PLAN

A 1996 analysis by the non-profit organization American Forests, in partnership with Miami-Dade County, determined that the tree canopy cover in unincorporated Miami-Dade County averaged only about 10 percent with some municipalities showing as little as one to two percent tree cover. The average metropolitan area in the United States has a tree cover of 33.4 percent. Metropolitan areas collectively support nearly one quarter of the nation's total tree canopy cover. Optimal urban canopy coverage is considered to be in the vicinity of 30-40 percent.

A number of factors have contributed to the diminished tree cover in Miami-Dade. Hurricane Andrew in 1992 destroyed a significant portion of the urban tree canopy in southern Miami-Dade County, but does not account for the entire deficit in tree cover. Additional causes include development activities, increased impervious areas, and the recent removal of trees due to citrus canker. In addition, some of the existing canopy consists of a high percentage of non-native invasive species, some of which threaten natural areas or present hazardous conditions in windstorms.

Adequate tree canopy is vital to the environmental and economic well being of our community. Trees improve air quality by absorbing pollutants and particulate matter from the air. Trees save energy by shading homes, offices, and streets, resulting in a reduced need for the use of air conditioning. Trees reduce storm water runoff by intercepting rainfall through their leaves and branches and releasing it slowly and also actively removing water from the soil. Trees increase property values by 5-15 percent and make communities more visually and environmentally appealing. Recent studies have also shown a positive correlation between trees and social benefits and quality of life indicators, including the reduction of reports of physical violence in homes that had trees outside the buildings and significantly better relations and stronger ties between neighbors (Kuo and Sullivan, University of Illinois). Additional benefits of trees include:

- ✓ Contributing to the processes of air purification, oxygen regeneration, and ground water recharge.
- ✓ Aiding in the abatement of noise, glare, heat, air pollution and dust generated by major roadways and intense use areas.
- ✓ Protection and buffering the effects of high winds on structures.
- ✓ Improving the aesthetic appearance of commercial, industrial, and residential development through the use of plant material, thereby complementing urban redevelopment by protecting and increasing property values within the community.
- ✓ Promoting physical and emotional well being by providing a connection with nature.
- ✓ Making neighborhoods more livable.
- ✓ Improving the pedestrian environment by providing shade in public spaces.
- ✓ Promoting public health and well being by providing an environmentally pedestrian friendly setting conducive to walking and non-motorized transportation.
- ✓ Establishing community identity, character and linkages.

The Street Tree Master Plan (Plan) establishes policy direction to begin management of Miami-Dade County's urban tree resources as a necessary priority. The Plan manages the green infrastructure (versus the gray infrastructure such as buildings, roads and other impervious surfaces). The Plan was developed to address the concerns of trees along our streets and highways, complementing the work of the County's Community Image Advisory Board along Miami-Dade's gateways, but providing a reference for urban tree resources. The Plan describes the procedures for planting and maintenance of street trees throughout Miami-Dade County and encourages partnerships with municipalities for the countywide implementation of the Plan for a greener, more livable community.

Healthy street trees play an integral role in supporting the County's urban shade "canopy," which: contributes greatly to the environment, lowers ambient air temperatures, increases aesthetic enjoyment, provides economic improvement, improves quality of life, and enhances the historic characteristics of our community. The Master Plan is guided by an overall vision to restore and enhance the County's tree canopy into a thriving urban forest that provides multiple aesthetic and environmental benefits. The Miami-Dade County Street Tree Master Plan, the Miami-Dade County Landscape Manual, and the proposed Best Management Practices are designed to support the vision by providing a "**greenprint**" for the appropriate planning, implementation, and management of our existing and planned tree resources.

Mission

The mission of the Miami-Dade County Street Tree Master Plan is to provide the framework to design and implement street tree plantings that complement the purpose and intent of the Landscape Ordinance and to be used as minimum standards in order to enhance the County tree canopy to a minimum of 30 percent coverage, countywide by 2015. This plan should emphasize the use of rare, threatened, and endangered native species and encourage the restoration and replanting of native plant communities.

Goals of the Street Tree Master Plan

- Emphasize the use of native trees in place of invasive or non-native species to reduce the negative impacts of these species to native plant communities.
- Emphasize the use of hardwood shade trees for canopy restoration while using palms solely as accent plants in public plantings. While palms are aesthetically pleasing and look "tropical," they do not provide the same environmental benefits as hardwood shade trees.
- Establish seed or vegetative sources for contract growing of rare and endangered species and use native species listed as "threatened" or "endangered" where feasible and appropriate.
- Encourage re-establishment, restoration, and replanting of historic ecological community associates and geographic conditions with the original native species where feasible or appropriate for current conditions.
- Increase biodiversity through the appropriate use of native tree species in the landscape.

- Provide a list of recommended street trees as per the Landscape Ordinance (See Chart 1, Pages 17 - 19) to give guidance to citizens and governmental agencies regarding which tree species survive better in harsh conditions for street trees, especially in swale areas. Median trees may offer more flexibility on species depending on the size of the planting area.
- Prevent the destruction of the community's existing street tree canopy and specimen sized-trees in conformance applicable local codes.
- Promote the expansion of the overall canopy in Miami-Dade County to at least 30 percent by 2015. This target reflects both the initiatives of the Street Tree Master Plan and other canopy restoration efforts in Miami-Dade County.
- Develop a maintenance program to maintain the existing inventory as well as new plantings to ensure long-term sustainability.
- Map and prioritize removal of hazardous street trees and replant where appropriate.
- Promote the concept of planting the right tree or plant in the right place to avoid damage to infrastructure such as clogged sewers, cracked sidewalks, and power service interruptions (See Chart 2 for Recommended Street Trees for Planting Adjacent to Power Lines).
- Improve the quality of street trees to minimally meet Florida Grades and Standards Grade #1 standards (Chapter 18A-6 (k) of the Code of Miami-Dade County, Florida).
- Develop a program for the selective replacement of undesirable species that may be brittle, invasive or not appropriate for rights-of-way plantings due to fruit drop or invasive roots. Tree replacement would focus on less problematic species listed in the Street Tree Master Plan.
- Use street trees, to visually define the hierarchy of roadways, and to provide shade and a visual edge along roadways. Utilize trees to identify "spatial-borders" of communities and civic spaces and emphasize the value of street trees in traffic calming projects.
- Promote the use of trees for energy conservation by encouraging cooling through the provision of shade and the channeling of breezes, thereby helping to offset global warming and local heat island effects through the added absorption of carbon dioxide and reduction of heat islands.
- Protect designated historic landscapes and tree resources.
- Encourage urban planning efforts to include the design of pedestrian friendly environments. Encourage provisions of wide sidewalks with sufficient space for trees where appropriate, in public design projects.
- Coordinate the tree planting, permitting, removal, and enforcement of all municipalities and County agencies and promote countywide cooperation in the restoration of canopy within Miami-Dade County.
- Educate the public, local discussion makers, and agency staff on the importance of the urban tree canopy and tree canopy enhancement education in the schools.
- Establish stewardship of the existing legacy of mature trees and effective planning for future planting and maintenance needs.

- Link urban and suburban environments with parks and natural areas. Identify and support a network of connectivity, through street planting, that complements greenway and blueway (paddling trail for non-motorized watercraft e.g. canoe or kayak) planning and implementation.
- Use street trees as a traffic calming device to support safe sidewalks and street crossings for school children and pedestrians in general.

Urban Tree Challenges

- **Planting the wrong tree in the wrong place:** Often urban areas have limited space restraints due to power lines and other utilities, signs, water requirements, poor or sometimes excessive drainage, and paving. These conditions cause the stress that is most often the cause of tree mortality in commercial/industrial areas.
- **Traffic Setbacks and Liability Concerns:** Often the setback requirements in the public rights-of-way are so restrictive that trees cannot be planted and limits the selection of tree species.
- **Poor Planting:** Improper planting, rough handling, girdling from staking and weed-eaters as well as planting poor quality trees are other reasons for high mortality of urban trees.
- **Lack of water and post planting care:** Recently planted trees as well as older trees under drought stress need to be watered to prevent decline.
- **Improper Pruning:** Topping and excessive pruning practices such as "hat-racking" are one of the biggest killers of urban trees. Although "hat-racking" is illegal in Miami-Dade County under the landscape and tree code, this code is difficult to adequately enforce given the current level of staff resources and levels of education on pruning available to the public. The County will continue to evaluate regulations; enforcement and education that require tree trimmers to have training and proficiency in proper pruning.
- **Chemicals:** Misuse of lawn treatment chemicals, herbicides and other chemicals that leach into the root zone or are absorbed through the bark, can adversely impact tree root systems, causing defoliation or general decline and death.
- **Soil compaction:** Extensive areas of compacted fill or road base soils and utility construction often are unsuitable for healthy root system growth and development.
- **Construction Damage:** Mechanical damage from construction equipment, crushing of near surface roots from heavy machinery and practices such as trenching through roots and paving over the root zone will cause decline and often mortality in urban trees.
- **Bark Damage:** Young as well as old trees often fall victim to being girdled by lawnmowers and string trimmers. In addition, car bumpers often damage trees.
- **Vandalism:** Vandalism such as graffiti painting, damaging the bark by carving, nailing and other physical abuses.
- **Air pollution:** Air pollution can affect trees by damaging foliage and impairing processes such as photosynthesis, thus impacting a tree's health and making it more susceptible to insect damage and disease.

- **Lack of maintenance or improper maintenance:** The lack of maintenance or improper maintenance including fertilization, mulching, pruning, and replacement of trees that have died, become a hazard, or are in a state of decline.
- **Invasive, non-native species:** Invasive, non-native species environmental damage by invading native plant communities and disrupting natural processes. Many landscape plants are not a problem for our natural resources. However, a few are so invasive that they have completely overrun natural forests and crowded out rare and unique plants found nowhere else in the world. Each year, it is costly to the County to protect our natural areas from these invasive pest plants. Residents and businesses can help by avoiding plants that are known to be invasive. Prohibited plant species are listed in the November 1999 Comprehensive Development Master Plan (CDMP), as amended which are demonstrably detrimental to native plants, native wildlife, ecosystems, or human health, safety, and welfare. Below is the listing of prohibited tree species.

Prohibited Tree Species

1. *Melaleuca quinquenervia* (cajeput or paperbark tree).
2. *Casuarina spp.* (Australian pine, beefwood).
3. *Schinus terebinthifolius* (Brazilian pepper).
4. *Bischofia javanica* (bishopwood).
5. *Ricinus communis* (castorbean).
6. *Ficus altissima* (lofty fig tree)
7. *Albizia lebbek* (woman's tongue).
8. *Acacia auriculaeformis* (earleaf acacia).
9. *Schefflera actinophylla* (Queensland Umbrella Tree).
10. *Ficus bengalensis* (banyon fig)
11. *Adenanthera pavonina* (red sandalwood).
12. *Cupaniopsis anacardioides* (carrotwood).
13. *Dalbergia sissoo* (Indian dalbergia, sissoo).
14. *Ficus microcarpa* (=F. *nitida*; =F. *retusa* var. *varnitida*) (laurel fig).
15. *Flacourtia indica* (governor's plum).
16. *Hibiscus tiliaceus* (mahoe).
17. *Leucaena leucocephala* (lead tree).
18. *Mimosa pigra* (catclaw mimosa).
19. *Thespesia populnea* (seaside mahoe).

In addition to the above listing, the following controlled species as listed in the County's Landscape Manual should not be planted within 500 feet of the native plant community they are known to invade.

Controlled Tree Species

Species (Common Name)	Native Plant Communities Invaded
- <i>Bauhinia variegata</i> (orchid tree)	Hammocks
- <i>Bauhinia purpurea</i> (orchid tree)	Hammocks
- <i>Calophyllum calaba</i> (= <i>C. iinophyllum</i>)(mast wood)	Hammocks
- <i>Catharanthus roseus</i> (Madagascar periwinkle)	Beaches, Sandy Pinelands/Hammocks
- <i>Derris indica</i> (pongamia pongam) (pongam)	Pinelands
- <i>Eugenia uniflora</i> (Surinam cherry)	Hammocks
- <i>Epipremnum pinnatum</i> cv. <i>Aureum</i> (pothos)	Hammocks, Pinelands
- <i>Kalanchoe pinnata</i> (life plant)	Hammocks
- <i>Lantana camara</i> (lantana)	Pinelands
- <i>Murraya paniculata</i> (orange jessamine)	Hammocks
- <i>Pittosporum tobira</i> (japanese pittosporum)	Pinelands
- <i>Pouteria campechiana</i> (canistel)	Hammocks
- <i>Psidium guajava</i> (guava)	Freshwater wetlands
- <i>Psidium littorale</i> (cattley guava)	Freshwater wetlands
- <i>Rhoeo spathacea</i> (oyster plant)	Pinelands, Hammocks
- <i>Sanservieria hyacinthoides</i> (- <i>S. trifasciata</i>) (bowstring Hemp)	Pinelands, Hammocks
- <i>Scaevola taccada</i> var. <i>sericea</i> (= <i>S. frutescens</i> ; = <i>s.sericea</i>) (<i>scaevola</i> ; half-flower)	Beaches
- <i>Syngonium podophyllum</i> (arrowhead)	Hammocks. Pinelands
- <i>Syzygium cumini</i> (jambolan; Java plum)	Hammocks,
- <i>Syzygium jambos</i> (rose apple)	Hammocks
- <i>Terminalia catappa</i> (tropical almond)	Coastal & freshwater wetlands
- <i>Tribulus cistoides</i> (puncture vine)	Sandy, Pinelands, Beaches
- <i>Washingtonia</i> spp. (Washington palm)	Coastal wetlands & beaches
- <i>Wedelia trilobata</i> (wedelia)	All communities
- <i>Zebrina pendula</i> (wandering zebrina)	All communities

Meeting the Goals of the Miami-Dade County Street Tree Master Plan

Maintenance of existing and newly planted street trees is a costly and essential activity that protects State, County, and municipal investment and lessens the cost of liability, while ensuring that the street tree population thrives and achieves desired aesthetic and environmental functions. The Department of Environmental Resources Management (DERM), coordinating with the following County departments; Public Works Department Right of Way Aesthetics and Assets Management Division (RAAM), Planning and Zoning, Consumer Services (Cooperative Extension), Park and Recreation, Team Metro, Community Image Advisory Board, and the Metropolitan Planning Organization, will be responsible for the implementation, monitoring, and maintenance activities described in the Master Plan, with oversight by the County Landscape Committee.

Appoint a County Certified Arborist

DERM will hire a County Arborist with appropriate certifications and training to implement the priorities and guidelines set forth in the Plan, including, but not limited to the following:

- Develop an inventory of street tree resources in the County.
- Evaluate and strengthen as necessary the guidelines for plan review that ensure adequate protection of existing trees during construction, including, but not limited to, installation of barriers to prohibit any disturbance within the drip lines of existing trees.
- Review County policies, procedures, and practices that may inhibit the implementation of the Street Tree Master Plan and the County Landscape Ordinance.
- Oversee the training of County tree and landscape maintenance crews.
- Institute partnerships with municipal agencies with responsibility for street tree planting and maintenance to establish intergovernmental efforts with regard to tree canopy restoration and enhancement.
- Establish policies to preserve existing tree resources prior to construction activities in the County public right-of-way.
- Ensure that all right-of-way planting activities adjacent to natural areas or preserves are species appropriate to that habitat and existing prohibited species are removed from the area at time of the planting.
- Develop a plan and oversee the removal of prohibited species from the public right-of-way and replacement with appropriate species.
- Conduct public meetings with homeowner groups and other stakeholders to reach a consensus about how the road corridors should look.
- Serve as liaison to community based organizations working with tree planting initiatives.
- Develop a cost-share tree-planting program for the rights-of-way.
- Update *Miami-Dade County Guide to Tree Planting and Maintenance in the Public Right-of-Way* as needed.
- Pursue funding opportunities with State, Federal, and private entities.
- Provide annual reports to the Board of County Commissioners on the State of the Urban Tree Canopy beginning in 2006 which detail the baseline study information and planting activities related to the Street Tree Master Plan.

Expand the Role of the County Landscape Committee

The County Manager will expand the role of the County Landscape Committee to oversee the status of the urban tree canopy and provide a forum for departmental input in the implementation of the Street Tree Master Plan

Street Tree Master Plan. As mentioned earlier, multiple departments are involved in street tree issues within Miami-Dade County. The Landscape Committee will coordinate cross departmental activities. The County Arborist will serve as a member and provide technical support to the Landscape Committee.

Inventory Conditions of Miami-Dade Street Trees

The County Arborist will coordinate with the Public Works Department to expand the County's present inventory of street tree plantings from 1992-2004 to include information such as health, existing site conditions, size, date planted, species and condition/structure of trees. This database will continue to be refined and updated with the use of GIS tools and shall incorporate all existing street trees. In the future, it is envisioned that the GIS database will be able to assist planners in expanding the biodiversity of the urban forest in planting activities.

Research Historical Habitat and Ecology

Research of historical conditions should be accomplished by using appropriate maps, surveys, and accounts to document what vegetation originally existed in sites to be planted. The historical physical conditions of the site (including geomorphology, topography, soils, hydrology, and vegetation) should be researched to compare historical and current conditions in order to determine whether restoration/re-creation of historic plant communities is appropriate. In many cases, existing conditions may not support historical plant species due to alterations of soil and hydrological conditions during construction of the right-of-way, however, in other cases, plant species that existed in certain geographic areas fare better when planted in the same geographical area. An example would be coastal species that thrive with high salinity conditions or mahogany trees, while natives do better and are less brittle in far south Miami-Dade County. Bringing back native species into their historical conditions can also save time and money in maintenance activities.

Develop Guidelines for Rare, Threatened or Endangered Tree Species

After determining the historical conditions of a given site and opportunities, constraints for restoration, locations and sources of seeds/vegetative material need to be identified within the historical growth range of the species. Propagation material should be collected without damaging the existing seed/vegetative material on site. All permits and permissions should be secured and locations and seed sources kept separate and documented. Propagation and experimental growth methodologies need to be developed for many of these species. Because many of these species are difficult to grow, contract growing should begin upon completion of the preceding tasks.

Methodologies

- County staff, a multidisciplinary team, consisting of a landscape architect, urban planner, biologist and arborist will design site-specific right-of-way plantings based upon analysis of historic and current conditions. The County will employ new technologies and incorporate, where appropriate, the findings of current research in urban forestry and horticulture. Future plantings will be coordinated with other departments and agencies such as Florida Department of Transportation (FDOT), utility companies; the Water and Sewer Department (WASD), and municipalities in order to avoid project conflicts with tree installations.
- Provide a baseline study to determine the current state of the urban tree canopy and update the information as trees are planted and removed with a canopy analysis every 10 years to measure progress towards the canopy goal.

- Develop a pest management plan for problem species including insect pests.
- Miami-Dade County will encourage dialogue and involvement of residents, municipalities, property owners, as well as coordination between all parties involved in street tree design and management.
- Coordinate activities with the Community Image Advisory Board to enhance landscaping on selected corridors and entryways in Miami-Dade County.
- Initiate infill planting in areas, including residential streets that have low canopy coverage. Encourage planting on private property in the form of setback plantings, which contribute to the streetscape.
- Explore the creation of a training and regulatory program for tree pruning operations.
- Coordinate and expand on the success of the Adopt-a-Tree Program goals:
 - ✓ Reforest Miami-Dade County
 - ✓ Educate the public on the significance of urban tree canopy in flood protection, erosion control, energy use, air quality, and community aesthetics.
 - ✓ Teach the public how to properly plant and care for trees.
 - ✓ Coordinate with Miami-Dade County municipalities to implement program activities within their municipal boundaries.
 - ✓ Implement a multilingual educational component addressing appropriate placement, planting procedure and long-term maintenance of the restored canopy.
 - ✓ Utilize plant material from local nurseries whenever possible so that it is locally adapted.
 - ✓ Improve the locally available tree stock by teaching the nurseries to grow high-quality new species.
 - ✓ Reinforce and expand upon partnerships with local environmental, educational, and community groups.
 - ✓ Seek additional matching funds and sponsorships to expand program efforts.
 - ✓ Limit the administrative costs associated with the program.
- Develop a cost-share program whereby a resident can select and purchase trees and have the County or a designated private contractor buy, plant, and stake the trees for the resident. As a part of this program, the resident would agree to assume the maintenance responsibility for the trees.
- Coordinate with the County's Landscape Committee on tree planting criteria when determining the prioritization of publicly funded planting activity.
- Explore "Tree City USA" designation for Miami-Dade County from the National Arbor Day Foundation. To qualify, the County must meet four standards: pass an Arbor Day Observance proclamation, enforce tree protection ordinances, appoint a tree committee, and contribute \$2.00 per capita of its annual revenue to tree care and planting. The feasibility of Countywide implementation or implementation in the Unincorporated Municipal Service Area (UMSA) would be explored by the County Arborist.

- Explore establishment of a Green Utility. One possible funding source for the greening of Miami-Dade County is to establish a green utility fee. The Florida Legislature (FL Statutes, 259.035) authorized local governments with populations exceeding 500,000 to collect fees through a voluntary check-off on a utility bill for the purpose of planting and maintaining the public trees, management of public natural areas, and to fund other tree related programs.

Educating Miami-Dade Citizens on Tree Canopy Issues

Develop a Public Education and Outreach Campaign

The successful implementation of the Street Tree Master Plan and compliance with the Landscape Ordinance require the involvement of residents, business owners, government officials, construction contractors, engineers, developers, landscape architects, landscape maintenance companies and employees, neighborhood associations, community planners, and tree care service contractors and employees - in other words, all of us.

Miami-Dade County has developed a *Miami-Dade County Guide to Tree Planting and Maintenance in the Public Right-of-Way* (Attachment B) to provide citizens with detailed information about the selection, placement, planting, and care of our tree resources.

In addition to the Guide, current existing educational resources include:

E-Government Link www.miamidade.gov

DERM Tree removal and planting permits information and application information
www.miamidade.gov/derm/Ecosystems/permits_tree_removal.asp

Adopt-A-Tree Program

www.miamidade.gov/derm/adoptatree

Cooperative Extension Service

www.miami-dade.ifas.ufl.edu

Team Metro office information

www.miamidade.gov/teametro

Landscape Ordinance

www.miamidade.gov/planzone

Dig in Dade

A stand-alone citizen forestry manual for property owners and residents on topics ranging from the benefits of urban trees, selecting the right tree for the right place, proper planting and care for urban trees, and contact information for community tree resources. This booklet is updated regularly and can be added to the digital library.

The Street Tree Master Plan is dedicated in memory of Jose R. Bacallao whose persistence and guidance motivated County staff during its development.

Miami-Dade Directory of Tree Organizations and Information Sources

Government Resources

Miami-Dade Dept. of Environmental Resources Management	305-372-6789 www.miamidade.gov/derm
Miami-Dade Urban Tree Program	305-372-6574
Miami-Dade Adopt-A-Tree Community Forestry Project	305-372-6555 www.miamidade.gov/adoptatree
Miami-Dade Parks & Recreation Department	305-755-7800 www.miamidade.gov/parks
Miami-Dade Planning and Zoning Department	786-315-2650 www.miamidade.gov/planzone
Miami-Dade Public Works Right-of-Way Aesthetics Management	305-375-1925 www.miamidade.gov/pubworks
University of Florida/Miami-Dade County Extension Plant advice for individuals & homeowners Advice for professional landscapers & condominium associations	305-248-3311 ext. 228 305-248-3311 ext. 231 www.ifas.ufl.edu
Florida Yards and Neighbors Program	305-248-3311 ext. 246 www.ifas.ufl.edu/programs/fyn.htm

Municipal tree contacts

Aventura	Community Services Public Works Division 19200 West Country Club Drive Aventura, FL 33180 (305) 466-8931 www.cityofaventura.com
<i>Uses Miami-Dade Public Works Department guideline. City decides species.</i>	
Bal Harbour Village	Beautification Committee 655 - 96th Street Bal Harbour, FL 33154 (305) 866-4633; FAX: 866-6575 www.balharbourgov.com
<i>No regulations but approval by Landscape Architect and Beautification Committee is needed</i>	
Bay Harbor Islands	Public Works Department 966 Bay Harbor Terrace Bay Harbor, FL 33154 (305) 866-6241; FAX: 866-4863 www.bayharborislands.org
<i>Swales are asphalted but any other trees get internal plan approval</i>	
Biscayne Park, Village of	Public Works Department 893 NE 109 Street Miami, FL 33161 (305) 893-4346; FAX: 893-4345 http://bphomeowners.com/news.htm

Coral Gables

Building & Zoning Director
City Hall
405 Biltmore Way
Coral Gables, FL 33134
(305) 460-5235; FAX: 460-5261
www.citybeautiful.net/index.html

Plans must be taken through landscape committee and maintenance covenant required

Doral

Public Works Department
8300 NW 53 St., Ste. 100
Doral, FL 33166
(305) 593-6725
www.doral.cc/news.htm

Miami-Dade County Public Works Department handles all permits

El Portal

Village Clerk
500 NE 87 Street
El Portal, FL 33138
(305) 795-7880
www.villageofelportal.com

No regulations for swale planting

Florida City

404 W Palm Drive, 2nd Floor
Florida City, FL 33034
(305) 247-8221
www.floridacityfl.us

Golden Beach

Town Manager or
Building & Zoning Director
One Golden Beach Drive
Golden Beach, FL 33160
(305) 932-0744; FAX: 933-3825
www.goldenbeach.us/index.html

Hialeah Gardens

Public Works Director
10001 NW 87 Avenue
Hialeah Gardens, FL 33016
(305) 558-4114; FAX: 819-5315
www.cityofhialeahgardens.org

Hialeah

Director of Streets Division
5601 E. 8th Avenue
Hialeah, FL 33013
(305) 687-2611; FAX: 687-2632
www.ci.hialeah.fl.us

Homestead

Public Works Dept.
790 No. Homestead Blvd.
Homestead, FL 33030
(305) 224-4842
www.cityofhomestead.com

Doesn't allow planting on ROW - only City plantings

Indian Creek Village

City Manager
9080 Bay Drive
Miami Beach, FL 33154
(305) 865-4121; FAX: 865-2502

Doesn't allow ROW plantings

Islandia

No Rights of way

Key Biscayne, Village of

Public Works Director
88 W. Macintyre
Key Biscayne, FL 33149
(305) 365-8945; FAX: 365-5556
www.vkb.keybiscayne.fl.us

Street trees are planned by species and approved by PWD director

Medley

Public Works Department
7331 NW 74 Street
Medley, FL 33166
(305) 889-1915
www.townofmedley.com/

Miami

Public Works Department
444 SW 2 Avenue, 3rd Floor
Miami, FL 33130
(305) 416-1050
www.ci.miami.fl.us

Written application process with an approved species list, no covenant

Miami Beach

Parks Director
2100 Meridian Avenue
Miami Beach, FL 33139
(305) 673-7720
www.miamibeachfl.gov

Application required and approval from parks and PWD. Have master plan with species specific by street

Miami Gardens

Code Enforcement
1515 NW 167 Street
Building 5, Suite 200
Miami Gardens, FL 33169
(305) 622-8020
www.miamigardens-fl.gov

City expects to have their Public Works Department functional by October 2004, until that time all permits are handled by the County Public Works Department

Miami Lakes

Code Enforcement
6853 Main Street
Miami Lakes, FL 33014
(305) 364-6100
www.townofmiamilakes.com

Replaces tree upon resident request with Live Oak

Miami Shores Village

Public Works Department
10050 NE 2 Avenue
Miami, FL
(305) 795-2210
www.miamishoresvillage.com

Does not allow planting by residents but Village will plant Palm, Live Oak or Mahogany if requested by resident

Miami Springs

Public Works Department
Tree Section
201 Westward Drive
Miami Springs, FL 33166
(305) 805-5170, option #3
www.miamisprings.com

Has an ordinance that allows planting on the swale and requires plan approval from list of pre-approved species.

North Bay Village

Building Department
7903 East Drive
Harbor Island
North Bay Village, FL 33141
(305) 754-6740
www.nbvillage.com/

All ROWs are for parking and DOT maintains the median strip

North Miami

Parks Department
776 NE 125 Street, Room 11
North Miami, FL 33161
(305) 893-6511, ext.2260
www.ci.north-miami.fl.us

Require resident to apply and do utility checks and City will sell Oak tree at half price. City will then take over maintenance of tree. City tree inventory is on database.

North Miami Beach

City Forester
Public Services
17050 NE 19 Avenue
North Miami Beach, FL 33162
(305) 948-2967
www.citynmb.com

Palmetto Bay

Public Works Department
8950 SW 152 Street
Palmetto Bay, FL 33157
(305) 259-1234
www.palmettobay-fl.gov

Pinecrest, Village of

Public Works Department
10800 Red Road
Pinecrest, FL 33156
(305) 669-6916
www.pinecrest-fl.gov

Species planned by landscape committee and installed by City contractor

Opa-Locka

Public Works Department
777 Sharazad Blvd.
Miami, FL 33054
(305) 953-2828
www.cityofopalocka.org

South Miami

Public Works Department
6130 Sunset Drive
South Miami, FL 33143
(305) 663-6350
www.cityofsouthmiami.net

Sunny Isles Beach

Zoning Department
17070 Collins Avenue
Sunny Isle Beach, FL 33160
(305) 947-0606; Fax: 949-3113
www.sibfl.net

Surfside

Public Works Department
9293 Harding Ave.
Surfside, FL 33154
(305)993-1058/1059
www.town.surfside.fl.us

Sweetwater

City Clerk's Office
500 SW 109 Avenue
Miami, FL 33174
(305) 221-0411; FAX: 221-2541
www.cityofsweetwaterflorida.com

Land development code requires planting in ROW for new buildings and approval for all ROW (streets have specific species, Black Olives are prohibited on the ROW).

Virginia Gardens

Public Works Department
or
Beautification Committee
6498 NW 38 Terrace
Miami, FL 33166
(305) 871-6104; FAX: 871-1120

West Miami

Public Works or Building & Zoning
901 SW 62 Avenue
Miami, FL 33144
(305) 266-4214

Unincorporated Municipal Service Area

Miami-Dade Urban Tree Program
DERM
33 SW 2 Avenue, 4th Floor
Miami, FL 33130
305-372-6574

Local Tree Organizations

TREEmendous Miami

305-378-1863
www.treemendousmiami.com

Florida Native Plant Society (Miami-Dade Chapter)

305-225-6404
www.fnps.org

Grove Tree-Man Trust

305-443-1312

Operation Green Leaves

305-644-9000
www.oglhaiti.com

Redland Tropical Gardens

305-258-5545

Street Tree Master Plan

Page 15 of 19

Tropical Flowering Tree Society

305-445-8076

Botanical Gardens

Doc Thomas House, 5330 Sunset Dr, South Miami

305-666-5111

Fairchild Tropical Garden, 10901 Old Cutler Rd, Coral Gables

305-667-1651
www.fairchildgarden.org

Miami-Dade Fruit & Spice Park, 25801 SW 187 Ave, Miami

305-247-5727
www.miamidade.gov/parks/Parks/fruit_spice.htm

Gifford Arboretum, San Amaro Dr, University of Miami

305-284-5364
fig.cox.miami.edu/Arboretum/gifford.html

Miami Beach Botanical Garden, 2000 Convention Center Drive

305-673-7245

Public Utilities

Sunshine State One (utility clearances - call 48 hours prior to digging) 1-800-432-4770

FPL-for a "Right Tree, Right Place" Planting Guide and free mulch

1-800-Dial FPL
www.fpl.com

South Florida Water Management District-for a Xeriscaping Guide

1-800-432-2045
www.sfwmd.gov

Other Information Sources

University of South Florida, Atlas of Florida Vascular Plants

www.plantatlas.usf.edu

University of Florida, Electronic Document Information Service

edis.ifas.ufl.edu

Florida Nurserymen & Growers Association

www.fnga.org

Association of Florida Native Nurseries

www.afnn.org

Florida Urban Forestry Council

407-872-1738
www.fufc.org

TreeLink

www.treelink.org

American Forests

www.americanforests.org

National Arbor Day Foundation

www.arborday.org

Urban Design Tree Planting

<http://hort.ifas.edu/woody/index>

USDA Forest Service Southern Region

www.urbanforestrysouth.usda.gov

Chart 1: Recommended Street Trees for Right-of-Way Planting

Common Name	Scientific Name	Height Range	Tree Size	Tree Type	Growth Rate	Special Needs
Allspice	<i>Pimenta dioica</i>	15' – 30'	Small	Shade	Slow	
Bald Cypress	<i>Taxodium distichum</i>	30' -60'	Large	Native	Moderate	Wet sites
Black Ironwood	<i>Krugiodendron ferreum</i>	20' – 30'	Small	Native	Slow	
Blolly	<i>Loblolly bay</i>	25' -35'	Med	Native	Moderate	
Colville's Glory	<i>Colvillea racemosa</i>	40' – 50'	Large	Flowering	Moderate	
Copperpod	<i>Peltophorum pterocarpum</i>	40' – 50'	Large	Flowering	Fast	
Dahoon Holly	<i>Ilex cassine</i>	20' –40'	Large	Native	Moderate	Wet areas
Geiger Tree	<i>Cordia sebestena</i>	20' – 25'	Small	Flowering	Moderate	Salt tolerant
Glaucous Cassia	<i>Senna surattensis</i> (<i>Cassia surattensis</i>)	10' – 20'	Small	Flowering	Fast	
Golden Shower	<i>Cassia fistula</i>	30' – 40'	Large	Flowering	Fast	
Green Buttonwood	<i>Conocarpus erectus</i>	30' –50'	Large	Native	Moderate	Salt tolerant
Guinea plum	<i>Drypetes laterfolia</i>	20' - 30'	Small	Native	Slow	
Gumbo limbo	<i>Bursera simaruba</i>	40' - 50'	Large	Native	Fast	
Inkwood	<i>Exothea paniculata</i>	25' –35'	Med	Native	Moderate	
Jacaranda	<i>Jacaranda mimosifolia</i>	40' – 50'	Large	Flowering	Fast	
Jamaica Dogwood	<i>Piscidia piscipula</i>	35' – 50'	Large	Native/ Flowering	Fast	
Krug's Holly	<i>Ilex krugiana</i>	25' – 30'	Small	Native	Moderate	
Lancepod	<i>Lonchocarpus violaceous</i>	30' –35'	Med	Flowering	Fast	Wet areas
Lancewood	<i>Nectandra coriacea</i>	25' – 35'	Med	Native	Moderate	
Live Oak	<i>Quercus virginiana</i>	40' – 50'	Large	Native	Moderate	
Madagascar Olive	<i>Noronhia emarginata</i>	20' – 30'	Small	Shade	Moderate	Salt tolerant
Mahogany	<i>Swietenia mahagoni</i>	35' –60'	Large	Native	Fast	
Mexican Cassia	<i>Caesalpinia mexicana</i>	20' – 25'	Small	Flowering	Moderate	
Paradise Tree	<i>Simarouba glauca</i>	35' – 50'	Large	Native	Moderate	
Pigeon Plum	<i>Coccoloba diversifolia</i>	25' – 30'	Small	Native	Moderate	
Podocarpus	<i>Podocarpus sp.</i>	30' –50"	Large	Shade	Moderate	
Queen's Crepe Myrtle	<i>Lagerstroemia speciosa</i>	30' – 45'	Large	Flowering	Moderate	
Red Bay	<i>Persea borbonia</i>	50' – 60'	Large	Native	Moderate	Wet areas

Recommended Street Trees for Right-of-Way Planting (continued)

Red Maple	<i>Acer rubrum</i>	30' – 45'	Large	Native	Fast	Wet areas
Rough Strong Bark	<i>Bourreria ovata</i>	15' – 20'	Small	Native	Moderate	
Satinleaf	<i>Chrysophyllum oliviforme</i>	20' - 30'	Small	Native	Slow	Wet and/or shady areas
Sea Grape	<i>Coccoloba uvifera</i>	15' – 35'	Large	Native	Moderate	Salt tolerant
Shortleaf Fig	<i>Ficus citrifolia</i>	40' – 50'	Large	Native	Fast	
Soapberry	<i>Sapindus saponaria</i>	20' - 30'	Small	Native	Moderate	
Sugarberry	<i>Celtis laevigata</i>	40' – 60'	Large	Native	Moderate	
Sweetbay Magnolia	<i>Magnolia virginiana</i>	30' -40'	Med	Native	Moderate	
Vera wood	<i>Bulneisa arborea</i>	30' - 35'	Large	Flowering	Moderate	
Torchwood	<i>Amyris elemifera</i>	10' – 15'	Small	Native	Slow	
West Indian Cherry	<i>Prunus myrtifolia</i>	30' – 40'	Large	Native	Fast	
White Cordia	<i>Cordia boissieri</i>	15' – 20'	Small	Flowering	Moderate	
White Mangrove	<i>Laguncularia racemosa</i>	40' – 60'	Large	Native	Moderate	Salt tolerant
Wild Tamarind	<i>Lysiloma latisilqua</i>	40' –50'	Large	Native	Fast	
Willow Bustic	<i>Dipholis salicifolium (Sideroxylum salicifolium)</i>	20' - 30'	Med	Native	Moderate	

List adapted from the Miami-Dade County Landscape Manual. For a complete listing of tree species, consult the Landscape Manual.

Chart 2: Recommended Street Trees for Planting Adjacent to Power Lines

Common Name	Scientific Name	Height Range	Tree Size	Tree Type	Growth Rate	Special Needs
Bitterbush	<i>Picramia pentandra</i>	12' - 18'	Small	Native	Moderate	
Black torch	<i>Erithalis fruticosa</i>	10' - 20'	Small	Native	Fast	
Cocoplum	<i>Chrysobalanus icaco</i>	10' - 20'	Small	Native	Moderate	Salt tolerant
Coral Bean	<i>Erythrina herbacea</i>	10' - 15'	Small	Native	Moderate	Salt tolerant
Crape Myrtle	<i>Lagerstromia indica</i>	15' - 20'	Small	Flowering	Moderate	
Frangipani	<i>Plumeria rubra</i>	15' - 20'	Small	Flowering	Slow	
Glaucous Cassia	<i>Senna surattensis</i> (<i>Cassia surattensis</i>)	10' - 20'	Small	Flowering	Fast	
Jaboticoba	<i>Myrciaria caulifolia</i>	10' - 25'	Small	Fruit	Slow	
Lignum Vitae	<i>Guaiacum sanctum</i>	10' - 30'	Small	Flowering /Native	Very Slow	
Limber caper	<i>Capparis flexuosa</i>	15' - 20'	Small	Flowering /Native	Moderate	
Locustberry	<i>Byrsonima lucida</i>	15' - 20'	Small	Flowering /Native	Slow	
Loquat	<i>Eriobotrya japonica</i>	15' - 20'	Small	Fruit	Fast	
Mexican Cassia	<i>Caesalpinia mexicana</i>	20' - 25'	Small	Flowering	Moderate	
Myrsine	<i>Myrsine guianensis</i> (<i>Rapanea punctata</i>)	15' - 25'	Small	Native	Slow	
Red stopper	<i>Eugenia rhombea</i>	15' - 20'	Small	Native	Moderate	
Redberry stopper	<i>Eugenia confusa</i>	15' - 20'	Small	Native	Moderate	
Rough Strong Bark	<i>Bourreria ovata</i>	15' - 20'	Small	Native	Moderate	
Saffron Plum	<i>Bumelia celastrinum</i> (<i>sideroxylon celastrinum</i>)	20' - 25'	Small	Native	Slow	
Silver Buttonwood	<i>Conocarpus erectus</i> var. <i>sericea</i>	10' - 25'	Small	Native	Moderate	Salt tolerant
Spanish stopper	<i>Eugenia foetida</i>	15' - 20'	Small	Native	Moderate	
Torchwood	<i>Amyris elemifera</i>	10' - 15'	Small	Native	Slow	
Twinberry/Simpson stopper	<i>Myrcianthes fragrans</i>	15' - 20'	Small	Native	Moderate	
Wax myrtle	<i>Myrica cerifera</i>	15' - 25'	Small	Native	Moderate	
White Cordia	<i>Cordia boissieri</i>	15' - 20'	Small	Flowering	Moderate	
White stopper	<i>Eugenia axillaries</i>	15' - 25'	Small	Native	Slow	
Wild Dilly	<i>Manilkara bahamensis</i>	15' - 20'	Small	Native	Slow	
Winged Sumac	<i>Rhus copallina</i>	15' - 20'	Small	Native	Fast	

Attachment B
**Miami-Dade County Guide to Tree
Planting and Maintenance in
The Public Right-of-Way**
DRAFT



Introduction

Tree Planting in the Public Right-of Way is a Guide to selecting, placing, protecting, and maintaining trees in the County Right-of-Way (ROW).

ROW's are found along roadways, in swales, and adjacent to homes and businesses. A healthy, functional, and attractive tree growing in any one of these locations provides benefits not only to the property owner, but to the surrounding community as well.

The goal of this guide is to provide you with basic and practical information on how to best accomplish the most important tree management activities.

Who Should Use This Guide

If you are a—

- Miami-Dade County Resident
- Government Official
- Construction Contractor
- Heavy Equipment Operator
- Landscape Maintenance Contractor or Employee
- Neighborhood Association officer or member
- Tree Care Service Contractor or Employee



--then this Guide is for you! *Your* implementation of the practices in this guide is an important component of our overall community tree management program.

This Guide supports the [Miami-Dade County Landscape Code](#) (Chapter 18A of the Code of Miami-Dade County, Florida), and should be used as a community education tool, and as a standard for community tree care. For specific planting requirements and project planning guidance, refer to the Miami-Dade County Landscape Manual.

This Planting Guide is just one part of a Countywide Tree Health Program. This Program includes an ongoing tree inventory, and a comprehensive tree planting and maintenance program of over 80,000 County installed trees within the public right-of-way.

Section 1: Tree Basics

The Benefits of Trees

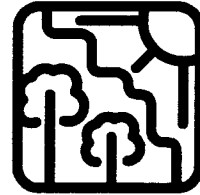
Trees provide you, and our community, with many environmental, social, and economic benefits. Many of these benefits are tangible and measurable. Some of the more important benefits are highlighted below:

Trees improve air quality.

- ★ Their leaves reduce carbon dioxide through absorption of carbon (the primary “global warming” gas) during the process of photosynthesis, and produce the oxygen we need to breathe.
- ★ Tree leaves also absorb other pollutants and particulate matter from the air.
- ★ A large, healthy tree can produce enough oxygen each day for 2 people.
- ★ Trees reduce pollution and absorb carbon monoxide, sulfur dioxide, nitrogen dioxide, and particulates.
- ★ Trees also reduce the amount of volatile organic compounds (VOC’s) that are released from our cars by providing a cool, shady spot to park. In the sun and heat, parked cars continue to release VOC’s from the gas tank, so tree canopy can significantly reduce the level of emissions.

Trees save energy.

- ★ They shade our homes and offices, and streets, parking lots, and other pavement that surround them.
- ★ They cool the air as their leaves evaporate water.
- ★ Leafy green tree crowns create a canopy of shade, reducing the amount of sunlight reaching our streets, lawns, and parking areas, resulting in lower summer temperatures.



Trees reduce storm water runoff and act as natural pollution filters

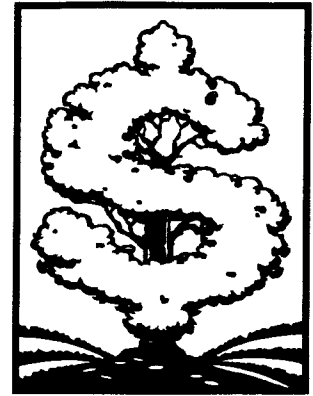
- ★ Their leaves and branches intercept rainfall and release it slowly, thereby reducing runoff and helping to maintain water quality.
- ★ The many leaves, branches, and stems of trees intercept rainwater, hold it, and then release it slowly so that it can be absorbed by the soil.
- ★ Tree roots also actively remove water from the soil.
- ★ The amount of overland flow of water and non-point source pollution that occurs during and after heavy rains is decreased by trees.

Other Benefits of Trees:

Trees increase property values, reduce erosion, increase real estate values, can increase sociological benefits, increase wildlife, reduce noise levels, improve economic sustainability and make communities more appealing creating community pride.

The Cost of Trees

While trees provide us with many benefits and are a valuable community asset, there are costs associated with their establishment, conservation, and maintenance.



Trees cost money to establish, maintain, and protect.

- Good quality planting stock is expensive, but by purchasing good quality trees, future replacement and maintenance costs can be reduced.
- Tree maintenance, especially pruning, must be done regularly to ensure tree health, safety, and longevity.
- Trees must be constantly monitored and protected from damage that may result from construction activities, utility line installation or repair, and pest problems.
- When trees decline beyond the point of improvement or when they die they require removal, which can be expensive for large trees.

Trees can grow larger than expected and may outgrow the space available.

- When tree branches grow into clear zones for utility lines, pedestrian walkways, buildings, streets, and vehicle and equipment travel lanes, they reduce clearance and sight distance and cause increased costs to maintain public safety.
- Without adequate growing space, trees will not achieve their potential for size, health, and longevity and will require more maintenance and will need to be replaced more often.

Trees can be hazardous.

- Many trees, either today or in the future, tower over our property and us. When whole trees or their parts fail and fall, they can cause utility service outages, damage to vehicles, homes, fences, and pavement, and personal injury.
- Tree roots that surface above ground can be a tripping hazard, and can cause damage to lawn mower blades. Trees left unpruned over walkways can cause personal injury.

While there are costs associated with trees, in most cases the benefits far outweigh the costs. The ratio of benefits to costs can be much improved with the implementation of the practices in this guide.

Tree Structure

A **tree** is defined as a woody plant that grows to 12 or more feet in height, usually with a single trunk, growing to more than 3 inches in diameter at maturity, and possessing an upright arrangement of branches and leaves. Trees are commonly referred to by their size, specifically their *mature* height.



In this Guide, tree heights are divided into **small**, **medium**, or **large** height classes and are defined as follows:

Small Trees: Less than 20 feet tall at maturity

Medium Trees: 20 to 30 feet tall at maturity

Large Trees: 30 or more feet tall or more at maturity

Trees, like people, are complex living organisms made up of many types of cells arranged into tissues and organs. Unlike people, they are only generating systems, and cannot regenerate new cells in the place of damaged or destroyed cells. Because trees generate new wood as they grow, they can get to be very large and achieve a huge volume (size) and mass (weight).

The three main parts of a tree are its **crown**, **trunk**, and **roots**.

The **crown** is the woody and leafy component of the tree. It is composed of large, scaffold limbs that support smaller branches, twigs, leaves, and buds. The leaves absorb carbon dioxide and in the presence of sunlight produce food—carbohydrates—in a process called photosynthesis. As a by-product, the trees leaves produce and release oxygen. Tree growth occurs at the tips of the branches, which can extend a few inches to several feet a year, depending upon the species and growing conditions. Tree crown size is measured as diameter in feet of the width of the branches at their greatest extent.

The horizontal projection of the tree crown onto the ground or the square foot area the crown covers is defined as the tree **canopy**. Tree canopy cover is calculated by multiplying the width of the crown in the north-south direction by the width of the crown in the east-west direction. For example, a tree with a crown width of 40 feet in the N-S direction and a width of 30 feet in the E-W direction has a canopy cover area of 1200 square feet. Estimates of mature crown canopy size categories for trees growing in urban areas are as follows:

Very Small Canopy: 150 square feet (approximately 12 x 12 feet)

Small Canopy: 400 square feet (20 x 20 feet)

Medium Canopy: 900 square feet (30 x 30 feet)

Large Canopy: 1600 square feet (40 x 40 feet)

The **trunk** is the main woody stem of the tree and supports the crown. While most trees normally have one stem or trunk, other trees are characteristically multi-stemmed. Carbohydrates and other substances necessary for tree growth are stored in the trunk, roots, and other woody portions of the tree. Water is transported up through the trunk to other parts of the tree. Tree size is often measured as **dbh** or “diameter at breast height” which is the diameter of the trunk at 4.5 feet above ground. For a tree forked at or below 4.5 feet, diameter is the sum of all the trunks at 4.5 feet above the ground.

You can calculate trunk diameter by measuring trunk circumference at 4.5 feet above the ground with a standard tape measure and dividing by pi or 3.14, a constant.

$$\text{Diameter} = \text{Circumference} \div 3.14$$

Beneath the **bark**—the outer protective layer that covers the trunk, limbs, branches, and roots—there is a very thin layer of specialized cells known as the **cambium layer**. The cambium layer is where growth in trunk and root diameter takes place each year when both a layer of wood (xylem) is produced to the inside, and a layer of inner bark (phloem) and bark are produced to the outside. The cambium layer functions as the food transport system for the tree.

The **roots** are the underground structures that anchor the tree and absorb water and nutrients essential for tree survival and growth. The anchoring roots are large, ropelike, and woody and usually number from 4 to 11.

Tree roots grow out from the trunk for a distance of at least 2 to 3 times the radius of the tree's crown, or at least 2 times the height of the tree.

However, they taper rapidly as they move away from the tree trunk. While the large roots grow out from the tree trunk, many small, fibrous absorbing roots arise from the woody roots and generally grow *up* and into the top layers of soil and leaf litter—layers rich in organic material. Attached to the fine root hairs on fibrous roots are beneficial fungi that combine with the root hairs to form **mycorrhizae**, structures of benefit to both the fungus and the tree. These structures increase the surface area that absorbs water and nutrients.

85% of a tree's roots are located in the top 18 inches of soil.

Tree Growth

Trees require a certain amount of basic substances and a specific combination of environmental conditions to function, survive and grow. Each individual tree species, like all plant species, has a *range* of soil moisture, soil volume, soil nutrient and acidity levels, air temperature, humidity, and sunlight in which it will grow. Under optimal conditions, trees will achieve their genetic potential for size, age, and form characteristic of their species. Under less than optimal conditions, trees will grow slower, be smaller at maturity, become easily stressed, have more deadwood, and will be more vulnerable to attacks by insects and disease organisms. As stated earlier, trees cannot regenerate or replace cells damaged or destroyed with new cells in the same location.

Because trees can only “seal” their wounds and cannot “heal” their wounds, any physical damage done to a tree's roots, trunk, or crown affects it for the rest of its life.

This is important to understand before we cut or damage a tree's roots, wound its trunk, break its limbs, or prune it incorrectly. The amount of energy that a tree is able to store has an effect on its ability to withstand unfavorable conditions and resist attacks by insects, fungi, bacteria, and other harmful organisms. This energy storage capacity is an important factor to consider when working around trees. Trees most affected by injury or stresses are those that store little energy, are fast growing, have inadequate soil volume and growing space, have been adversely affected by weather conditions, have been repeatedly wounded, or are at a critical point in their seasonal or life stage development.

The Critical Root Zone and Tree Protection Zone

Because trees contribute so much to our quality of life, they must be actively conserved, wisely selected, well placed, well planted, routinely maintained, and constantly protected. One of the most critical steps in planning for trees and cost effective ways of managing trees is to maintain adequate growing space for each tree's roots, trunk, and crown throughout the tree's life.



Remember that as a tree gets older it gets larger and the growing space it requires increases accordingly.

For existing trees, there is a minimum amount of area, above (for the trunk and crown) and below ground (for soil health and the root system) that is required to protect trees and preserve tree health. This area has been identified as the **critical root zone (CRZ)** or **tree protection zone (TPZ)** by various experts and is generally agreed to be equivalent to the *soil area below ground and the space above ground defined by the tree's dripline*, or the greatest extent of the branches. This is depicted in Figure 1. However, for small trees, newly planted trees, and trees with narrow crowns, the dripline defines an area that is too small for proper protection.

So it is best to define both the critical root and tree protection zones as the circular area above and below ground with a radius equivalent to the greater of 6 feet or 1.5 feet for every inch in trunk diameter at 4.5 feet above the ground.

Both concepts--critical root zone and tree protection zone--are used throughout the remainder of this Guide. TPZ is more often used when talking about tree protection. The minimum requirements for the amount of open soil surface area are listed below, by tree canopy size:

Very Small Canopy: 25 square feet (5 x 5 feet)
Small Canopy: 100 square feet (10 x 10 feet)
Medium Canopy: 225 square feet (15 x 15 feet)
Large Canopy: 400 square feet (20 x 20 feet)

Larger areas are recommended wherever possible.

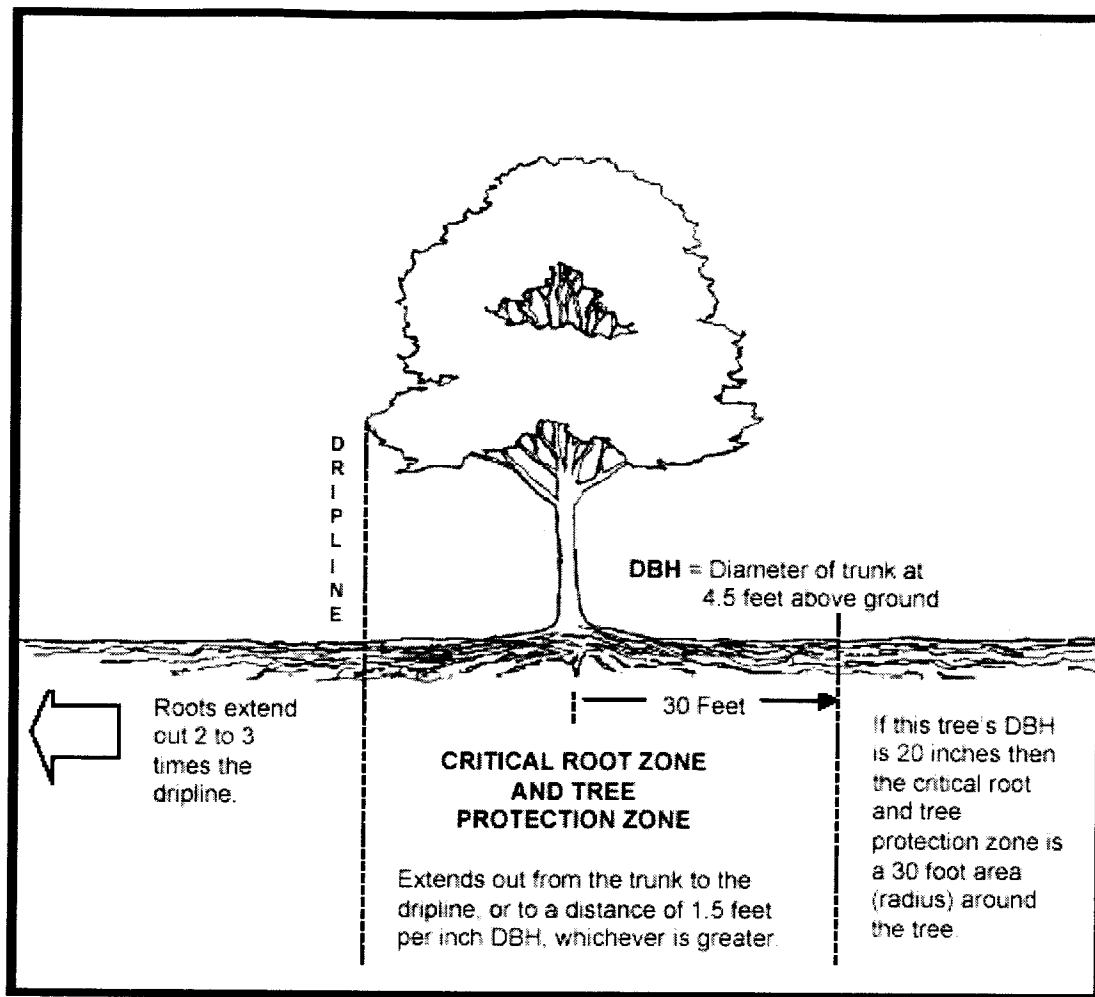


Figure 1. Location of the Critical Root Zone and Tree Protection Zone

Section 2: Best Management Practices for Tree Selection and Placement

Throughout Miami-Dade County there are a number of site situations that have unique characteristics important to the establishment and prolonged health of trees. Selecting a well-structured, healthy tree as defined in the Landscape Code, as “Florida Fancy” or Florida #1” (Chapter 18A-6 (k) of the Code of Miami-Dade County, Florida) will contribute to the tree’s establishment and prolonged health. Site selection is equally important for the tree’s future viability. For example, placing trees that thrive in wet conditions in arid locations does not contribute to prolonged health and vigor. In each situation, if trees are well selected and placed, they will provide recognizable, tangible benefits to the property owner and community.

Tree Species Selection

Tree selection is an important part of tree conservation and planting. Native species, together with a few proven non-native species, are listed in the Tree Species List located on the following page. The recommended trees included in the list are the choices of local and regional experts. These species form a broad palette of trees for use in our landscapes. Some of the important species characteristics and growth requirements that should be considered when making tree management decisions are included in the attached Tree List.

The **benefits** of knowledgeable tree selection include:

- ★ a healthy environment with abundant tree canopy
- ★ reduced tree maintenance with better species-to-site match
- ★ diversity of species promoting forest stability
- ★ varied and interesting landscape

Some **common mistakes** made when selecting trees to conserve or plant include:

- × reliance on non-native tree species
- × reliance on a few popular species which are over-planted
- × incorrect species-to-site match
- × large trees selected and planted where small growing spaces exist

Best Management Practices for Tree Species Selection

1. Go Native! Plant trees that are native to the site that you are planting.
2. Plant Florida Grade 1 trees or better.
3. Plant large canopy trees wherever adequate space exists.
4. Maintain species diversity by conserving and planting a variety of tree species.
5. Evaluate your site conditions—sunlight, soil pH, nutrient availability, soil moisture, and growing space--and select species for planting whose requirements match those conditions.
6. Select species that will best provide the function desired on the site (i.e. use non-deciduous trees for buffering and screening).

Recommended Street Trees for Right-of-Way Planting

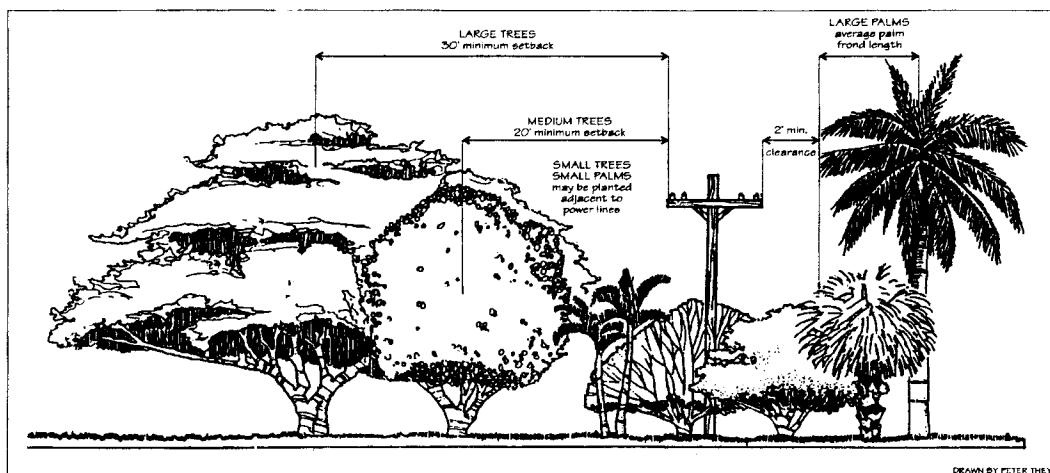
Common Name	Scientific Name	Height Range	Tree Size	Tree Type	Growth Rate	Special Needs
Allspice	<i>Pimenta dioica</i>	15' – 30'	Small	Shade	Slow	
Bald Cypress	<i>Taxodium distichum</i>	30' -60'	Large	Native	Moderate	Wet sites
Black Ironwood	<i>Krugiodendron ferreum</i>	20' – 30'	Small	Native	Slow	
Blolly	<i>Loblolly bay</i>	25' -35'	Med	Native	Moderate	
Colville's Glory	<i>Colvillea racemosa</i>	40' – 50'	Large	Flowering	Moderate	
Copperpod	<i>Peltophorum pterocarpum</i>	40' – 50'	Large	Flowering	Fast	
Dahoon Holly	<i>Ilex cassine</i>	20' –40'	Large	Native	Moderate	Wet areas
Geiger Tree	<i>Cordia sebestena</i>	20' – 25'	Small	Flowering	Moderate	Salt tolerant
Glaucous Cassia	<i>Senna surattensis</i> (<i>Cassia surattensis</i>)	10' – 20'	Small	Flowering	Fast	
Golden Shower	<i>Cassia fistula</i>	30' – 40'	Large	Flowering	Fast	
Green Buttonwood	<i>Conocarpus erectus</i>	30' –50'	Large	Native	Moderate	Salt tolerant
Guinea plum	<i>Drypetes laterfolia</i>	20' - 30'	Small	Native	Slow	
Gumbo limbo	<i>Bursera simaruba</i>	40' - 50'	Large	Native	Fast	
Inkwood	<i>Exothea paniculata</i>	25' –35'	Med	Native	Moderate	
Jacaranda	<i>Jacaranda mimosifolia</i>	40' – 50'	Large	Flowering	Fast	
Jamaica Dogwood	<i>Piscidia piscipula</i>	35' – 50'	Large	Native/ Flowering	Fast	
Krug's Holly	<i>Ilex krugiana</i>	25' – 30'	Small	Native	Moderate	
Lancepod	<i>Lonchocarpus violaceous</i>	30' –35'	Med	Flowering	Fast	Wet areas
Lancewood	<i>Nectandra coriacea</i>	25' – 35'	Med	Native	Moderate	
Live Oak	<i>Quercus virginiana</i>	40' – 50'	Large	Native	Moderate	
Madagascar Olive	<i>Noronia emarginata</i>	20' – 30'	Small	Shade	Moderate	Salt tolerant
Mahogany	<i>Swietenia mahagoni</i>	35' –60'	Large	Native	Fast	
Mexican Cassia	<i>Caesalpinia mexicana</i>	20' – 25'	Small	Flowering	Moderate	
Paradise Tree	<i>Simarouba glauca</i>	35' – 50'	Large	Native	Moderate	
Pigeon Plum	<i>Coccoloba diversifolia</i>	25' – 30'	Small	Native	Moderate	
Podocarpus	<i>Podocarpus sp.</i>	30' –50"	Large	Shade	Moderate	
Queen's Crape Myrtle	<i>Lagerstroemia speciosa</i>	30' – 45'	Large	Flowering	Moderate	
Red Bay	<i>Persea borbonia</i>	50' – 60'	Large	Native	Moderate	Wet areas

Recommended Street Trees for Right-of-Way Planting (continued)

Red Maple	<i>Acer rubrum</i>	30' – 45'	Large	Native	Fast	Wet areas
Rough Strong Bark	<i>Bourreria ovata</i>	15' – 20'	Small	Native	Moderate	
Satinleaf	<i>Chrysophyllum oliviforme</i>	20' - 30'	Small	Native	Slow	Wet and/or shady areas
Sea Grape	<i>Coccoloba uvifera</i>	15' – 35'	Large	Native	Moderate	Salt tolerant
Shortleaf Fig	<i>Ficus citrifolia</i>	40' – 50'	Large	Native	Fast	
Soapberry	<i>Sapindus saponaria</i>	20' - 30'	Small	Native	Moderate	
Sugarberry	<i>Celtis laevigata</i>	40' – 60'	Large	Native	Moderate	
Sweetbay Magnolia	<i>Magnolia virginiana</i>	30' -40'	Med	Native	Moderate	
Vera wood	<i>Bulneisa arborea</i>	30' - 35'	Large	Flowering	Moderate	
Torchwood	<i>Amyris elemifera</i>	10' – 15'	Small	Native	Slow	
West Indian Cherry	<i>Prunus myrtifolia</i>	30' – 40'	Large	Native	Fast	
White Cordia	<i>Cordia boissieri</i>	15' – 20'	Small	Flowering	Moderate	
White Mangrove	<i>Laguncularia racemosa</i>	40' – 60'	Large	Native	Moderate	Salt tolerant
Wild Tamarind	<i>Lysiloma latisiliqua</i>	40' -50'	Large	Native	Fast	
Willow Bustic	<i>Dipholis salicifolium</i> (<i>Sideroxylum salicifolium</i>)	20' - 30'	Med	Native	Moderate	

List adapted from the Miami-Dade County Landscape Manual. For a complete listing of tree species, consult the Landscape Manual.

Figure 2. TREE SIZES NEAR POWER LINE



The FPL recommended distances for trees and palms to power lines.

See other specific requirements for planting under power lines in Chapter 18A.

Recommended Street Trees for Planting Adjacent to Power Lines

Common Name	Scientific Name	Height Range	Tree Size	Tree Type	Growth Rate	Special Needs
Bitterbush	<i>Picramia pentandra</i>	12' - 18'	Small	Native	Moderate	
Black torch	<i>Erithalis fruticosa</i>	10' - 20'	Small	Native	Fast	
Cocoplum	<i>Chrysobalanus icaco</i>	10' - 20'	Small	Native	Moderate	Salt tolerant
Coral Bean	<i>Erythrina herbacea</i>	10' - 15'	Small	Native	Moderate	Salt tolerant
Crape Myrtle	<i>Lagerstromia indica</i>	15' - 20'	Small	Flowering	Moderate	
Frangipani	<i>Plumeria rubra</i>	15' - 20'	Small	Flowering	Slow	
Glaucous Cassia	<i>Senna surattensis</i> (<i>Cassia surattensis</i>)	10' - 20'	Small	Flowering	Fast	
Jaboticoba	<i>Myrciaria caulifolia</i>	10' - 25'	Small	Fruit	Slow	
Lignum Vitae	<i>Guaiacum sanctum</i>	10' - 30'	Small	Flowering /Native	Very Slow	
Limber caper	<i>Capparis flexuosa</i>	15' - 20'	Small	Flowering /Native	Moderate	
Locustberry	<i>Byrsonima lucida</i>	15' - 20'	Small	Flowering /Native	Slow	
Loquat	<i>Eriobotrya japonica</i>	15' - 20'	Small	Fruit	Fast	
Mexican Cassia	<i>Caesalpinia mexicana</i>	20' - 25'	Small	Flowering	Moderate	
Myrsine	<i>Myrsine guianensis</i> (<i>Rapanea punctata</i>)	15' - 25'	Small	Native	Slow	
Red stopper	<i>Eugenia rhombea</i>	15' - 20'	Small	Native	Moderate	
Redberry stopper	<i>Eugenia confusa</i>	15' - 20'	Small	Native	Moderate	
Rough Strong Bark	<i>Bouffieria ovata</i>	15' - 20'	Small	Native	Moderate	
Saffron Plum	<i>Bumelia celastrinum</i> (<i>sideroxylon celastrinum</i>)	20' - 25'	Small	Native	Slow	
Silver Buttonwood	<i>Conocarpus erectus</i> var. <i>sericea</i>	10' - 25'	Small	Native	Moderate	Salt tolerant
Spanish stopper	<i>Eugenia foetida</i>	15' - 20'	Small	Native	Moderate	
Torchwood	<i>Amyris elemifera</i>	10' - 15'	Small	Native	Slow	
Twinberry/Simpson stopper	<i>Myrcianthes fragrans</i>	15' - 20'	Small	Native	Moderate	
Wax myrtle	<i>Myrica cerifera</i>	15' - 25'	Small	Native	Moderate	
White Cordia	<i>Cordia boissieri</i>	15' - 20'	Small	Flowering	Moderate	
White stopper	<i>Eugenia axillaries</i>	15' - 25'	Small	Native	Slow	
Wild Dilly	<i>Manilkara bahamensis</i>	15' - 20'	Small	Native	Slow	
Winged Sumac	<i>Rhus copallina</i>	15' - 20'	Small	Native	Fast	

Best Management Practices for Road Frontage Areas

1. Plant trees only where there is adequate room both overhead and underground for the mature size of the tree you are planting.
2. Vary the spacing of trees along road right-of-ways to add interest and diversity to roadway plantings (the Miami- Dade County Landscape Manual stipulates an average maximum spacing of 35').
3. Select trees from the recommended list for right-of-way plantings to avoid restricted, nuisance or high maintenance species.
4. Make sure that trees are planted where drivers can see pedestrians and vehicles when pulling out of intersections.
5. Avoid planting trees directly over property lines or corners.
6. Provide clearance for large vehicles such as buses and delivery along tree-lined streets and drives.
8. Provide at least 10 feet of clearance for pedestrians and bicyclists to avoid hazards created by low branches or trees too close to sidewalks and drives.
9. Consider the impact of utility line maintenance along roadways and canal maintenance activities along canals when planting.
10. Avoid over-thinning a natural stand to reduce susceptibility to wind damage and uprooting.
11. Remember that the closer you plant a tree to the street in a frontage area, the more stress the tree will experience.
12. Tunnel or bore instead of trenching during utility line installation to avoid damaging tree roots.
13. Swales—the planting area between the sidewalk and curb—should meet permit specifications.
14. Consider the installation of root barriers along sidewalks and curbs to prevent tree roots from heaving and breaking pavers, sidewalks, curbs, and road pavement.
15. Check with your municipality for permitting requirements.

Section 3: Best Management Practices for Tree Care

Regardless of where trees are located in our landscapes, all trees require some level of care. This level of care generally increases as our interaction with the tree and our impact upon the tree increases. Trees in urban environments require a high level of care, since our interaction with them is frequent. The following section addresses basic tree care activities.

Soil Health Maintenance

is the preservation of natural soil conditions that are conducive to plant growth. Preserving *soil* health is essential to preserving tree *root* health, which in turn promotes *whole tree* health. While it seems that some trees will grow anywhere, most trees are particular about the soil conditions under which they will thrive.



Soil consists of basic components--mineral matter, organic matter, soil organisms, and pore spaces that hold water and oxygen. Both the texture of the soil (relative components of sand, clay, and loam) and the structure of the soil (arrangement of soil particles) are important factors in determining how much water and oxygen a soil can hold.

Soil fertility is also important, and can be evaluated using standard tests that measure the amount of phosphorous, potassium, calcium, magnesium, zinc, and manganese in the soil. The availability of these elements is affected by soil pH and organic matter content. Soil tests can determine the soil pH (acidity/alkalinity) and the amount of organic matter present by weight. In South Florida, soil is generally alkaline.

Soil moisture levels also affect the health of a tree (see "Tree Selection and Placement"). Refer to the Recommended Street Trees for Right-of-Way Plantings list for specific information on which species thrive in wet conditions and which do well in dry conditions.

Maintaining soil health and adequate soil volume provides the following **benefits**:

- ★ improved tree survival, growth, and longevity
- ★ maintenance of structural integrity of the root system and reduction in the probability of whole tree failure
- ★ allows for root development without intrusion of roots into sewer lines
- ★ reduced soil erosion and improved water quality

To maintain healthy soil and tree roots, avoid these **common mistakes** within (and as far as possible beyond) the tree's critical root zone (CRZ):

- × compacting soil with foot, vehicle, and equipment traffic and materials storage
- × cutting roots by trenching for utility line installation or repair
- × grade changes, including cuts and fills
- × change in water drainage patterns and water levels
- × soil contamination from equipment washouts, vehicle and lawn maintenance chemicals
- × lack of adequate soil volume within and around hardscapes such as tree wells, plazas, and parking lots
- × fertilization without testing
- × heavy applications of fertilizer
- × heavy applications of weed and feed products to turf within the root zones of trees

Trees require adequate volumes of soil in which their roots can expand, allowing for tree growth.

It is very important to recognize that a tree's requirement for growing space and soil rooting volume increases as the tree ages and size increases. At the time they are planted, trees should be provided with enough growing space for their future, mature size.

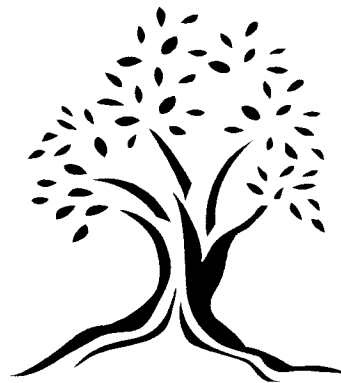
If adequate soil volumes are not available throughout a tree's life, then much more intensive management is required, and the tree will be reduced in size, condition, and useful life span.

Tree Establishment

consists of a series of steps that begins with the development of a planting plan designed to meet the objectives of the property owner or the requirements of local development regulations. Once a plan is developed, the establishment process continues with the selection of planting sites and appropriate species.

The sites are prepared, trees are purchased and planted, new tree maintenance begins, and regular

maintenance continues for at least 3 years, completing the establishment process. New trees should be planted on a regular basis--to replace trees that are removed, to add to an existing group of trees, and to ensure that our community forest remains diverse, dynamic, and stable.



The **benefits** of regular and successful tree establishment are:

- ★ stable tree population with a diversity of ages, sizes, and species
- ★ maintenance of tree canopy cover for future generations
- ★ opportunities for community involvement in tree planting and maintenance activities
- ★ better survival and lower tree establishment costs

Common mistakes made in tree establishment include:

- × not enough growing space provided and the tree grows too large for the available space
- × inadequate soil volume provided, restricting root growth and decreasing tree stability
- × species planted do not meet the site conditions of available growing space, soil moisture and pH, sunlight, temperature, or general climate
- × poor quality planting stock (i.e. "Florida #2" and/ or "Cull") is selected, most often with co-dominant leaders (forked stems) or inadequate root system trees are planted in a hole that is too small
- × tree is planted too deep, below ground level
- × planting hole not filled in with material that was dug out of the hole
- × regular after-planting care is not provided during the 3-year establishment period
- × trees are staked unnecessarily
- × tree watering rings remain in place longer than 1 year
- × stakes and guy wires are incorrectly placed or left in place longer than 1 year

Best Management Practices for Tree Establishment

Tree Selection

1. Select a tree from the recommended Right-of-Way Tree List (from the Landscape Manual).
2. Select a tree of appropriate size (at maturity) for the site.
3. Select native tree species for planting if they are available and where they match the site conditions, instead of non-native species.
4. Use proven, non-native species for special purposes or difficult situations.
5. Select only good quality planting stock, trees with a good quality root system, a straight trunk without wounds, a single, central leader (no "forked" stems), and a full, well-balanced crown (Florida grade one or better).
6. Select trees that meet the minimum standards for root ball size quality and as defined in the American Standards for Nursery Stock.
7. Place trees where they have plenty of room to grow to maturity without their health or form being compromised by conflicts with infrastructure.
8. Provide trees with an adequate amount of soil volume for tree growth and stability.
9. Make sure there is now and will be at tree maturity adequate clearance from overhead utility lines, pedestrian and vehicular traffic, buildings, signs, and street lights.
10. Plant at least 10 feet from an underground utility line.
11. Plant only small maturing trees within 10 feet of an overhead utility line.

Site Preparation

13. ALWAYS call the Sunshine State One at 1-800- 432-4770 for utility locations before you dig to install trees.
14. Till, harrow, or break up compacted soils in an area 5 to 10 times the width of the new tree's root ball or container.
15. Dig a planting hole that is at least 2 times and as much as 5 times the width of the new tree's root ball or container.
16. Dig the planting hole no deeper than the height of the new tree's root ball or in other words, no deeper than the height of the soil in its container.
17. Do not add soil amendments such as peat moss or fertilizer to the planting hole.

Tree Planting

18. Move the tree using only the root ball or container; avoid using the tree trunk as a "handle" to move trees, which can break tree roots and damage the trunk.
19. Plant the root ball at or slightly above ground level, never below.
20. Remove all tags, wires, string, straps, burlap, and wire baskets from the root ball.
21. Backfill the planting hole with the original soil.
22. Water once when the planting hole is halfway full of soil, and again thoroughly when full to eliminate air pockets.
23. Do not create a watering ring around the tree unless soil conditions are very dry; remove rings after one year.

New Tree Maintenance

24. Mulch newly planted trees with leaves, pine straw, or other organic materials to 3-4" in depth and in a 5-foot radius around the tree, or as wide as possible; keep the mulch at least 5 inches from the tree trunk.
25. Prune only dead, broken, crossed, or rubbing branches; prune annually thereafter only when needed.
26. Water daily at first and slowly taper off watering in the absence of adequate rainfall.
27. Establish tree protection zones (TPZs) around new trees during construction activities.
28. Inspect newly planted trees regularly to evaluate their condition and maintenance needs.
29. Remove stakes and guy wires after one year.

Proper tree planting is essential to long-term tree survival and health. Figure 3 shows the recommended method for planting a tree.

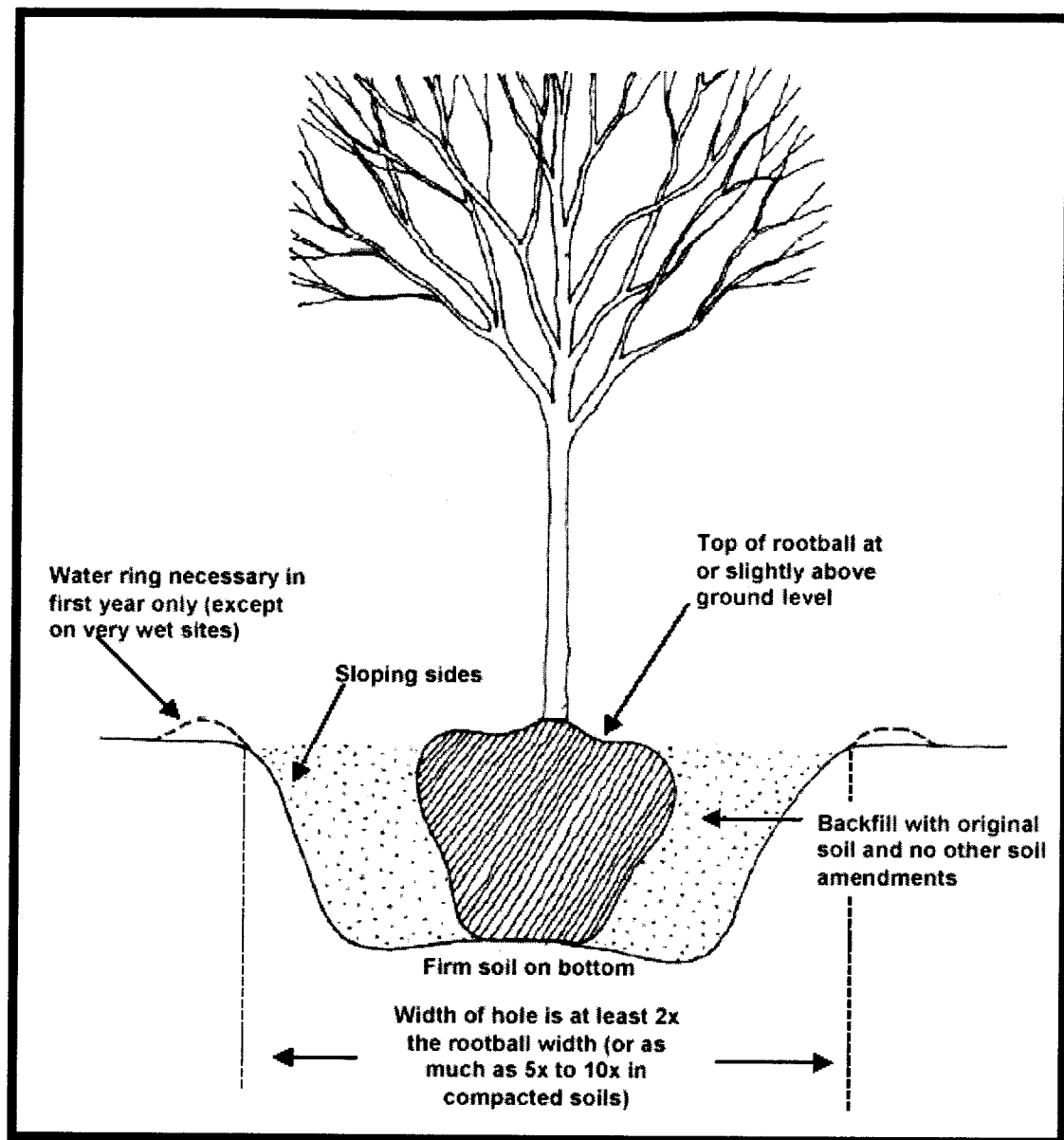


Figure 3 Recommended Tree Planting Method

Tree Maintenance

The routine care given to a tree throughout its life will preserve or improve its health, function, and safety. The amount of maintenance a tree requires depends on the species, the tree's location in the landscape, its age, and the care (or abuse) it receives. Basic tree maintenance begins with regular inspections to determine a tree's needs, which may include **pruning, mulching, fertilization, irrigation, and pest management**. Each of these maintenance activities is discussed separately below.

Tree Pruning

Pruning is the deliberate removal of tree branches and limbs to achieve a specific objective in the alteration of a tree's size, spread, health, and form. Regular inspections to determine a tree's pruning needs should be a part of every tree maintenance program. Always determine your objective before beginning pruning.

The **benefits** of correct tree pruning are:

- ★ **better tree form, health, and structural integrity**
- ★ **removal of decaying and diseased wood**
- ★ **decrease in overall risk of limb failure**

Some of the **common mistakes** made in tree pruning include:

- × **improper techniques such as topping, stub cuts, flush cuts, and stripping the bark beneath the pruning cuts**
- × **using spikes to climb trees for pruning**
- × **waiting until limbs get large to prune them**
- × **pruning trees on a crisis only basis such as a hurricane**
- × **pruning to reduce tree size as a substitute for proper tree selection and placement**
- × **hiring untrained maintenance crews to conduct the trimming activities**
- × **over lifting of canopy**

Best Management Practices for Tree Pruning

1. **Hire only experienced professionals to prune trees; arborists certified by the International Society of Arboriculture (i.e. certified arborists) are required to pass a written test of basic arboricultural knowledge and to attend continuing education courses to maintain their certification.**
2. **NEVER "top" trees. This is an unacceptable practice and greatly decreases tree health, safety, and longevity.**
3. **NEVER use climbing spikes or spurs while pruning trees, except during an emergency rescue.**
4. **Trees should be inspected before climbing to determine the amount and extent of hazards, and the tree owner should be notified of potentially hazardous or harmful conditions.**
5. **Keep pruning equipment sharp, clean, and in good operating condition.**
6. **When pruning limbs that show evidence of disease, sterilize pruning equipment between trees.**
7. **Always prune trees back to the parent branch or a lateral that is at least 1/3 the diameter of the branch being pruned.**
8. **Prune just outside of the branch collar.**
9. **At time of planting, prune only to remove dead, broken, crossed, or rubbing branches.**
10. **Prune trees when young to develop branch structure, strength, and form.**

11. Prune off one of two leaders on trees with co-dominant (forked) stems.
12. Prune trees regularly throughout their life to maintain vehicular, pedestrian, and sight clearance, and to remove deadwood and broken branches.
13. Make proper pruning cuts using the 3-cut method, avoiding stub cuts, flush cuts, and wounds to remaining limbs and trunk (see Figure 3).
14. Do not remove more than 1/4 of the foliage of any tree or branch in any one growing season.
15. Always wear personal protective safety equipment while pruning, including safety glasses.
16. NEVER prune (or remove) trees located near energized electrical service or other utility lines; to have a tree growing beneath utility lines pruned or removed, contact your utility service provider for a approved utility line tree trimmers.
17. To avoid over lifting of canopy, one half (1/2) of the foliage should originate on the lower two thirds (2/3) of the tree.

A recommended method commonly employed to safely remove large tree limbs is illustrated in Figure 4 (see following page).

When removing a branch, make your cut back to the trunk or parent limb, just outside the branch collar, at an approximately 45-degree angle to the branch bark ridge. In Figure 4, Cut 1 is made first, then Cut 2 is made just outside of Cut 1. At this time the majority of the branch begins to fall, breaks at Cut 1, and is removed without stripping the bark below Cut 1. Cut 3 is then made just outside the branch collar or swelling at the base of the branch and the remainder of the branch or limb is removed.

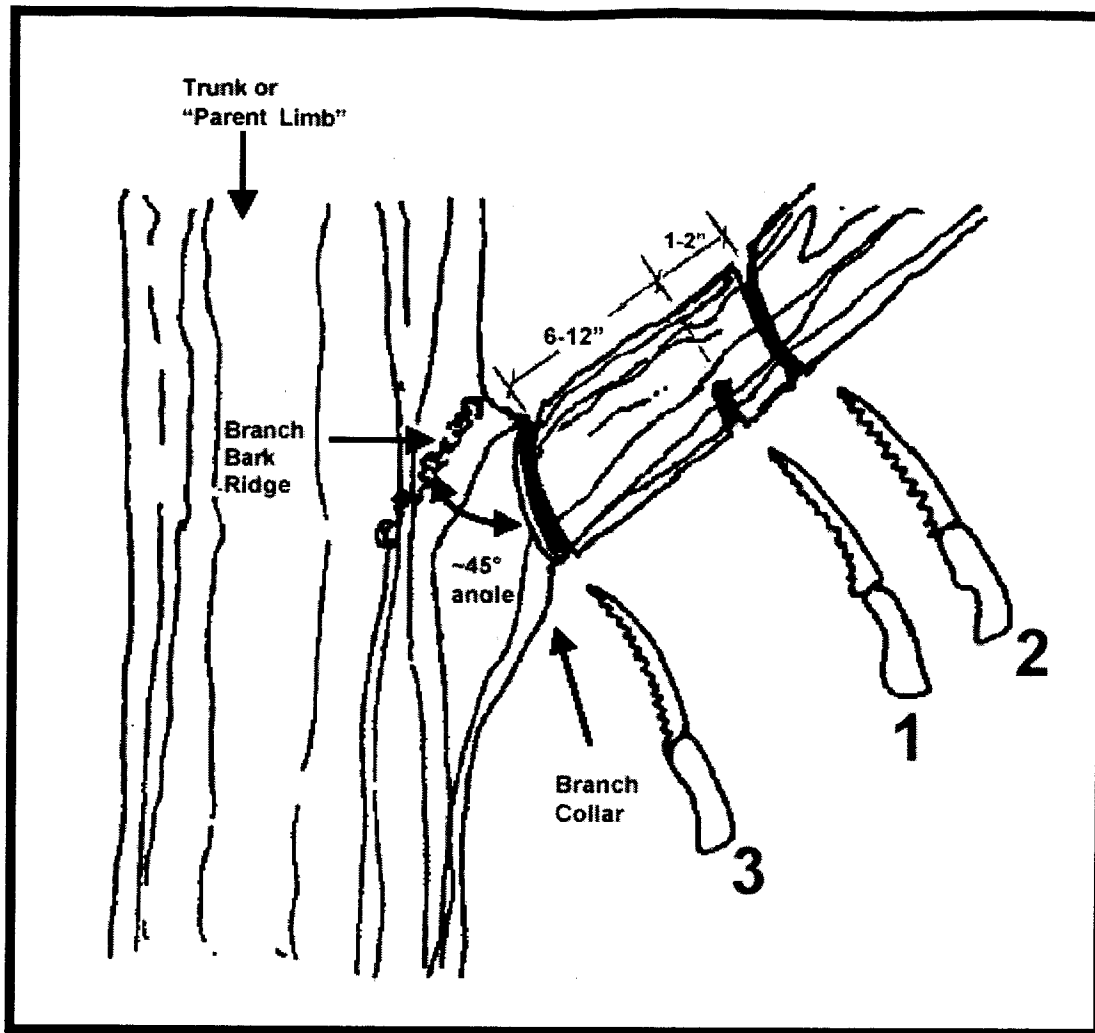


Figure 4. The 3-Cut Pruning Method

Tree Mulching

Mulching is the application of organic material on top of the ground over a tree's root system to improve soil moisture and fertility and to enhance root and tree growth. The objective in mulching is to recreate the conditions found in undisturbed, natural woodlands.

Mulching provides **benefits** to trees because it:

- ★ retains soil moisture
- ★ moderates soil temperatures
- ★ suppresses weed growth
- ★ improves soil fertility and structure over time
- ★ recreates the natural conditions under which trees grow in the forest, conditions which includes a thick layer of leaves and composted organic matter
- ★ eliminates the need for mowing and weed trimming around the base of trees minimizing bark damage from landscaping equipment

When mulching, these **common mistakes** are often made:

- × lack of regular mulch applications
- × mulch ring is much too small and covers very little of the root zone of the tree
- × mulch is piled up in a "volcano" fashion around the tree trunk
- × mulch is touching the tree trunk
- × black plastic, or other impermeable materials are used for "mulch"
- × string weed trimmers are used to cut weeds within mulch beds, often damaging tree trunks in the process

Best Management Practices for Tree Mulching

1. Use organic materials such as pine straw, leaves, aged wood chips, and compost; avoid grass clippings, plastic, and rocks.
2. For newly planted trees, mulch an area at least six feet around the tree.
3. For established trees, mulch out to the dripline or as far out as practical.
4. Spread mulch in an even layer, 3-4" deep; avoid mounding the mulch around the tree trunk.
5. Keep mulch at least 5 inches from the tree trunk to avoid creating favorable places for pests.
6. Mulch twice per year, in the late spring and in fall during leaf fall.
7. Use a tree's own leaves for mulch.
8. Avoid using string weed trimmers around the base of trees to remove weeds within mulch beds; hand pull weeds or use a contact herbicide to kill weeds.

As simple as mulching can be, if done improperly it can cause problems for the tree such as insect, disease, and rodent damage, or a decrease in soil aeration or moisture. Use Figure 5 (following page) as a guide for recommended mulching methods.

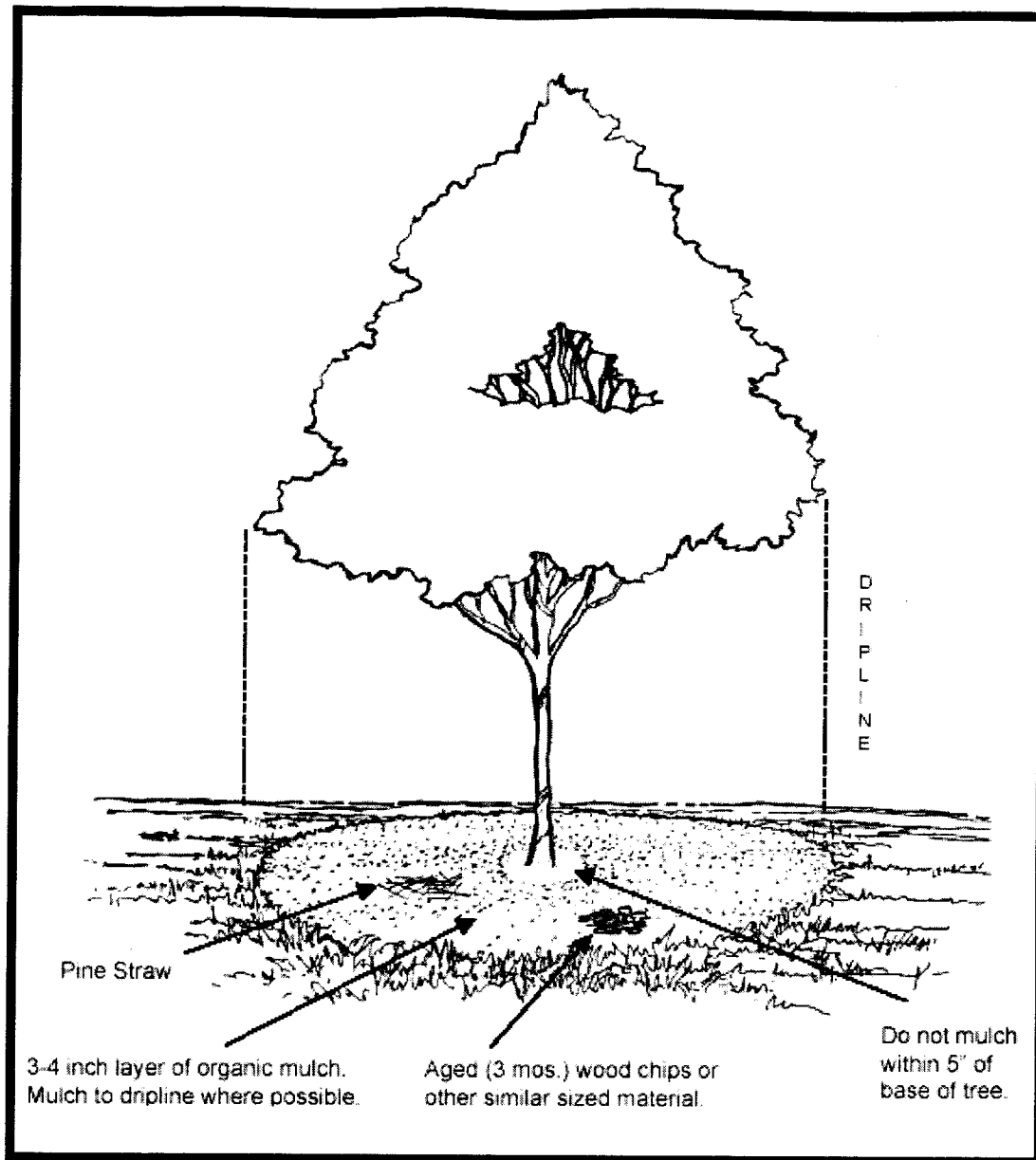


Figure 5. Recommended Method for Tree Mulching

Tree Fertilization

Fertilization is the application of nutrients to the soil or plant leaves to enhance growth. It should only be done for a specific purpose or to correct a specific deficiency discovered through soil testing or foliar analysis. The Cooperative Extension Service (305-248-3311) may provide fertilization advice and soil sample analysis, as do private laboratories.

The **benefits** of fertilization include:

- ★ healthier, more extensive root systems
- ★ increased growth and larger trees at an earlier age
- ★ healthier tree in better condition to defend itself against pests

To enhance tree growth through fertilization, avoid these **common mistakes**:

- × fertilization without knowledge of nutrient availability and deficiencies
- × over fertilization, either too much at one time, or too often
- × use of weed and feed fertilizers beneath trees

Best Management Practices for Tree Fertilization

1. Apply fertilizer based upon recommendations resulting from a soil test to address known deficiencies.
2. Do not apply fertilizer to newly planted, drought stressed, or severely wounded or injured trees.
3. Apply fertilizer when the roots are actively growing; late winter, early spring, and early summer are the best times to fertilize.
4. Use an NPK fertilizer ratio of 3:1:1 or 3:1:2 in the absence of a recent soil test.
5. Use slow release organic fertilizers with a salt index of less than 50.
6. Apply slow release fertilizers to trees at a rate between 2 and 4 pounds of nitrogen per 1000 ft² of root area.
7. Apply fertilizer to the CRZ of trees, from the trunk to the dripline, but only once to overlapping root zones.
8. Do not use fertilizer injections and implants into the trunk for routine fertilization.

The amount of fertilizer that should be applied to achieve recommended nitrogen fertilization rates are listed in Table 1.

Table 1

N-P-K	Pounds of Fertilizer to Apply Per 1000 Sq Ft to Achieve a Rate of		
Fertilizer Formulation	2.0 lbs of N	3.0 lbs of N	4.0 lbs of N
5-X-X	40.0	60.0	80.0
10-X-X	20.0	30.0	40.0
15-X-X	13.3	20.0	26.7
20-X-X	10.0	15.0	20.0
30-X-X	6.7	10.0	13.3

Tree Irrigation

Irrigation involves the regular application of water to the root systems of a tree in the CRZ to supplement rainfall. Water is essential to tree growth, the absorption of elements and nutrients, and the production of food energy. Irrigation may be done simply using a hose, sprinkler, or bucket, or may be accomplished with a large capacity water tank or installed irrigation system.

Irrigation provides **benefits** such as:

- ★ better tree growth with fewer periods of stress and less susceptibility to insect and disease infestation
- ★ better tree survival, less replanting, more economical tree establishment costs
- ★ requires visits to the tree which can also serve as a time for regular tree inspections

When watering trees, avoid these **common mistakes**:

- × newly planted or damaged trees are not watered regularly during hot and dry periods
- × too little water is applied during each irrigation period, or water runs off and does not penetrate the soil
- × small amounts of water are applied too often, encouraging shallow rooting
- × trees are watered too much and too frequently, keeping roots and soil “waterlogged” for prolonged periods of time

Best Management Practices for Tree Irrigation

1. Plant trees at or slightly above ground level to avoid creating a place where excessive water may accumulate.
2. Match tree species to soil moisture conditions, utilizing upland and drought resistant trees where soil moisture is typically low, and lowland and flood tolerant species where soil moisture is typically high or where the site is frequently flooded.
3. Mulch trees to conserve water.
4. Water trees before they show signs of water stress.
5. Water during the hours of 5 p.m. to 8 a.m.
6. Water less often with greater amounts of water rather than more often with smaller amounts of water.
7. Apply water evenly throughout the outermost 75% of the CRZ.
8. Apply water slowly to avoid runoff outside of the CRZ.

The amount of water required for a tree depends upon its age, trunk diameter, and the size of its root zone. To determine the amount of water to apply to your tree's root zone, first calculate the radius of the CRZ. Then, calculate the number of seconds it takes you to fill a 5-gallon bucket of water with the hose or water delivery system you are using. Match that time to the closest number of seconds listed in Table 2 to the radius of your CRZ to find the total application time required to water your tree. These numbers assume that you are watering the outermost 75% of the CRZ.

Table 2. Approximate Watering Time to Apply One Inch of Water Across Various Sized Critical Root Zones

Radius of CRZ (ft)	Volume of Water (gals) to Equal 1"	Total Application Time (minutes and hours) at a Delivery Rate of 5 Gallons Per				
		5 Sec	15 Sec	30 Sec	45 Sec	60 Sec
5	37	1 min	2 min	4 min	6 min	7 min
10	147	3 min	7 min	15 min	22 min	30 min
15	330	6 min	17 min	33 min	50 min	1 hr
20	587	10 min	29 min	1 hr	1 hr 30 min	2 hrs
25	917	15 min	46 min	1 hr 30 min	2 hr 30 min	3 hrs
30	1,322	22 min	1 hr	2 hrs	3 hr 30 min	4 hrs 30 min
35	1,799	30 min	1 hr 30 min	3 hrs	4 hr 30 min	6 hrs
40	2,349	39 min	2 hrs	4 hrs	6 hrs	8 hrs
45	2,973	50 min	1 hr 30 min	5 hrs	7 hrs 30 min	10 hrs
50	3,670	1 hr	3 hrs	6 hrs	9 hrs	12 hrs

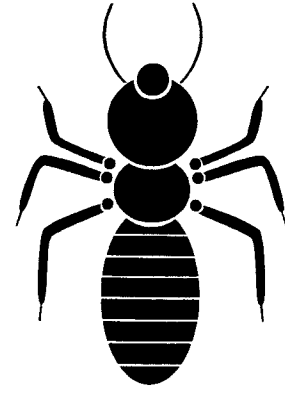
Pest Management

Pest Management is the control of weeds, insects, fungi, bacteria, or other tree pests through a variety of techniques and at a level that meets your management objectives.

The best approach to pest management is an integrated one that utilizes prevention, biological controls, and--when warranted and absolutely necessary--chemical controls.

The **benefits** of timely pest management include:

- ★ increase in knowledge of impact and life cycle of tree pests
- ★ reduction in the number of trees affected
- ★ increased tree health with timely pest identification and management



Some **common mistakes** made in managing tree pests include:

- × trees are planted that are highly susceptible to common pests
- × changes in tree condition and pest symptoms and signs are ignored
- × pest problems are allowed to reach catastrophic proportions before treatment is considered
- × pesticides are over-used or are selected as the first option
- × pesticides are applied at a stage when they are ineffective on, or do not reach, the pest
- × tree trunks are painted white to defend against insects (this is not effective)

Best Management Practices for Pest Management

1. Plant trees where their needs will match the site conditions to prevent stress and predisposition of trees to pest attacks.
2. Mulch to relieve soil moisture stress and to suppress weeds; pull weeds *by hand* where necessary around the base of trees.
3. Protect tree roots, trunks, and limbs from wounds. Wounds are entry points for insects and diseases.
4. Learn the habits and life cycle of the pests affecting your trees, and know when to apply pesticides for the greatest effect.
5. Hire only experienced and knowledgeable professionals to apply pesticides
6. Do not apply any soil active herbicides or weed-and-feed lawn formulations over the root systems of trees.
7. Contact the Cooperative Extension Service for instructions on collecting insect and disease organisms, or signs for analysis and identification.

Tree Removal and Replacement

are activities that will have to occur for every tree at some point. The overall goals of tree removal and replacement are to maintain public safety and community forest health while also preserving tree canopy cover.



There are many reasons why trees must be removed. They may be growing in the wrong location, without adequate growing space, and are in conflict with hardscape (driveways, walkways, etc.) or other infrastructure (buildings, roadways, overhead utility lines). They may be old trees that are at the end of their normal life span. They may be dead or in poor or hazardous condition, and may require removal to protect the safety of the owner or the public in general. Whatever the reason for removal, the site should be evaluated to determine if another tree can be planted in the same or a nearby location to maintain tree canopy cover in the area.

The **benefits** of timely tree removal and replacement include:

- ★ reduced risk of failure with the prudent removal of trees
- ★ reduced risk of pest infestations and damage to other trees
- ★ additional space for new, vigorously growing trees

Common mistakes made in tree management that cause tree removals include:

- × trees are not provided with adequate space to grow to maturity
- × large maturing trees are planted beneath utility lines
- × trees are neglected and not routinely maintained
- × tree preservation activities are undertaken only when a tree is in poor condition
- × trees in poor condition without reasonable chances for improvement or repair are left to fall apart instead of being removed
- × trees are planted that have a characteristic unsuitable for their location

Best Management Practices for Tree Removal and Replacement

1. Have an experienced arborist (ISA certified) evaluate tree health and risk for failure before removing old, large, landmark, or historic trees, or trees damaged in a storm to avoid unnecessary tree removal. Some species are able to be righted after a storm and survive for many more years.
2. Check with the Miami-Dade County Department of Environmental Resources Management (DERM) or your municipality regarding tree removal permitting requirements.
3. Hire only experienced professionals to remove trees.
4. Reduce the number and frequency of necessary tree removals through proper tree selection, placement, protection, and maintenance.
5. Evaluate trees at risk for failure, using standard methods, which include the assessment of the probability of failure, size of part that may fail, and the targets that may be affected should the tree fail.

6. Remove trees in irreversible health, and poor condition.
7. Remove trees creating a hazardous situation that cannot be remedied with pruning, cabling and bracing, or removal of the target.
8. Replace trees wherever and whenever possible, planting large canopy trees.
9. Hire only FPL approved tree trimmers to remove trees located near or beneath utility lines; do not attempt to remove these trees yourself.
10. To preserve landmark or historic trees with an increased risk of partial or whole tree failure for as long as possible, consider removing the target by restricting public access or moving valuable structures (Check with your local Historic Preservation office for information on the designation of historic trees).
11. Positively identify ownership before authorizing tree removal.
12. Plant, plant, plant for a greener and more livable community.

Portions of this material have been used with permission from Athens, Clark County, Georgia and amended for use in Miami-Dade County.